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NACA

RESEARCH MEMORANDUM

for the

Bureau of Aeronautics, Navy Department

PRELIMINARY RESULTS OF ALTITUDE-WIND-TUNNEL INVESTIGATION OF X24C-4B TURBOJET ENGINE

V - PERFORMANCE OF MODIFIED ENGINE

By William R. Prince, and Harry E. Bloomer

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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

WASHINGTON

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SUMMARY

An investigation has been conducted in the NACA Cleveland altitude wind tunnel to evaluate the performance characteristics of a modified X24C-4B turbojet engine over a range of simulated altitudes from 5000 to 45,000 feet, simulated flight Mach numbers from 0.25 to 1.07, and engine speeds from 4000 to 12,500 rpm. The engine was modified by the manufacturer to improve the velocity and temperature profiles within the engine. Performance data are graphically presented to show the effect of altitude at a flight Mach number of 0.25 and the effect of flight Mach number at an altitude of 25,000 feet. Original and modified engine performances for several specific operating conditions are compared. A complete tabulation of average pressures and temperatures throughout the engine, performance data, and lubrication and fuel-system data is presented.

The average temperature pattern at the turbine outlet for the modified engine conformed more closely to the manufacturer's desired temperature distribution than for the original configuration. A comparison of original and modified engine performance data showed that with the modified configuration a thrust increase from 5 to 14 percent based on original engine output was obtained for several specific operating conditions. Application of the generalization factors showed that performance variables depending upon fuel consumption that are obtained at one altitude cannot be used in predicting the values of these parameters at any other altitude; however, thrust and air-flow values can be predicted for a limited range of altitudes from data taken at one altitude.

INTRODUCTION

Performance and operational characteristics of an X24C-4B turbojet engine have been investigated in the NACA Cleveland altitude wind tunnel at the request of the Bureau of Aeronautics, Navy Department. Data presenting pressure and temperature distributions, engine performance, and compressor performance are reported in references 1, 2, and 3, respectively.

A modified X24C-4B turbojet engine was investigated after completion of the tests of the original engine. Engine modifications were made by the manufacturer to improve the velocity and temperature profiles within the engine. The effect of the modifications on the compressor performance is presented in reference 4.

The effects of altitude and flight Mach number on the performance of the modified engine are presented herein. The applicability of methods used to generalize the data in order to estimate the performance at various altitudes from performance data obtained at any altitude is discussed. A complete tabulation of average pressures and temperatures throughout the engine, performance data, and lubrication and fuel-system data is presented.

APPARATUS AND INSTRUMENTATION

The modified engine was installed in a wing nacelle in the test section of the altitude wind tunnel in the same manner as the original engine (fig. 1). In order to obtain pressures at the engine inlet that corresponded to a wide range of flight Mach numbers, dry refrigerated air was supplied to the engine through a duct from the tunnel make-up air system. The compressor, the combustion chamber, and the exhaust nozzle of the basic X24C-4B engine, described in detail in reference 1, were modified for the present investigation.

The compressor was modified to improve the radial velocity distribution at the compressor-outlet annulus by twisting the eleventh-stage rotor blade tips 6° in the direction of reduced angle of attack.

The combustion chamber (fig. 2) was modified to improve the temperature distribution at the turbine inlet. The wall perforations of the fourth step of the combustion-chamber liner were omitted and the circular wall perforations in the third step were changed to rectangular. The total area of the holes in the third step of the modified liner was equal to the hole area of the third

and fourth steps in the original liner. Introducing the air into the combustion chamber farther upstream, and thereby increasing the penetration, improved the mixing in the secondary combustion zone. The blocking area of the screens at the annular combustion-chamber inlet was reduced. For the original configuration, a screen having 60-percent blocking area was installed in the outer annulus and one having 40-percent blocking area was installed in the intermediate annulus. In the modified combustion chamber, these screens were replaced by two screens of 30-percent blocking area. The fuel nozzles for the modified engine had a rated capacity of 7 gallons per hour at a differential pressure of 100 pounds per square inch, as compared to $7\frac{1}{2}$ gallons per hour for the original engine.

With improved temperature distribution at the turbine inlet, the manufacturer increased the allowable temperature limits at the turbine outlet from 1250° to 1400° F, as indicated by the hottest thermocouple; a reduction in exhaust-nozzle area was consequently required to obtain the new temperature limits with the modified engine. The exhaust nozzle used in this investigation had an outlet area of 170.6 square inches as compared to an area of 183.1 square inches for the original engine.

Temperature and pressure measurements were obtained at eight stations in the engine (fig. 3). The instrumentation installed in the modified engine remained the same as that in the original configuration with the exception of the addition of three temperature rakes at the turbine outlet, making a total of 55 thermocouples at that survey station. Location and details of the instrumentation installed in the original engine are presented in reference 1.

PROCEDURE

Performance characteristics of the engine were obtained at simulated altitudes from 5000 to 45,000 feet, simulated flight Mach numbers from 0.09 to 1.07, and engine speeds from the idling speed of 4000 rpm to the rated speed of 12,500 rpm. For most operating conditions, the inlet-air temperature was held at approximately NACA standard values corresponding to the simulated flight conditions. Inlet-air temperatures below -20° F, corresponding to high altitude and low flight Mach number, were not obtained. At the higher altitudes, the minimum engine speed was sometimes limited by combustion blowout and the maximum engine speed by a turbine-outlet temperature of 1400° F at the hottest thermocouple.

Thrust was measured with the tunnel balance scales and was also calculated from pressure and temperature measurements obtained at the exhaust-nozzle outlet. Air flow was calculated from pressure and temperature measurements made in the engine-inlet duct and at the exhaust-nozzle outlet. Both values of jet thrust and air flow are presented in the tabulated data; performance parameters presented in the tabulated data and the performance curves that involve thrust and air flow are calculated by using thrust measured by the balance scales and air flow measured at the engine inlet. The methods of calculation used in this report are the same as presented in reference 2.

RESULTS AND DISCUSSION

A summary of performance data, average pressures and temperatures throughout the engine, and lubrication and fuel-system data is presented in tables I, II, and III, respectively, for all altitudes, flight Mach numbers, and engine speeds at which data were obtained with the modified engine and a 170.6-square-inch exhaust nozzle. A comparison of average temperature patterns at the turbine outlet for both the original and modified engines showing the relation to the manufacturer's desired temperature distribution is presented in figure 4 for an altitude of 5000 feet, engine speed of 12,500 rpm, and a flight Mach number of 0.25. In order to conserve turbine life, operation of the original engine was limited to a maximum turbine-outlet temperature limit of 1250° F (1710° R). As a result of the modifications made to the engine, the temperature distribution at the turbine inlet was improved and the temperature limit raised to 1400° F (1860° R) as indicated by the hottest thermocouple. The average temperature pattern at the turbine outlet for the modified engine with a 1400° F limit (fig. 4) conformed more closely to the manufacturer's desired temperature distribution than did the original configuration. The data indicate that the temperature limit for the original engine was somewhat more conservative than that of the modified engine.

Engine Performance

Effect of altitude. - The effect of altitude on engine performance is shown in figure 5 for data obtained at a constant flight Mach number of 0.25 and altitudes from 5000 to 45,000 feet. The trends of the performance curves for the modified engine followed closely those of the original engine. Jet thrust, net thrust, air flow, and fuel consumption are presented in figures 5(a), 5(b), 5(c), and 5(d), respectively.

The specific fuel consumption based on net thrust (fig. 5(e)) was not appreciably affected at any engine speed when the altitude was raised from 5000 to 15,000 feet and was unaffected at engine speeds above 10,000 rpm when the altitude was raised to 25,000 feet; however, further increase in altitude above 25,000 feet raised the specific fuel consumption at all engine speeds.

The fuel-air ratio (fig. 5(f)) increased as the altitude was raised; the increase in fuel-air ratio became more pronounced at the high altitudes. The minimum fuel-air ratio occurred at an engine speed between 9000 and 10,000 rpm for each altitude.

The exhaust-nozzle-outlet total temperature (fig. 5(g)) increased at the high engine speeds as the altitude was raised. For engine speeds below approximately 11,000 rpm, an increase in altitude to 25,000 feet decreased the exhaust-nozzle-outlet temperature; however, for altitudes above 25,000 feet, the temperature increased considerably.

Effect of flight Mach number. - The effect of flight Mach number on engine performance is shown in figure 6 for data obtained at an altitude of 25,000 feet and flight Mach numbers from 0.25 to 1.07. For all engine speeds, raising the flight Mach number increased the jet thrust (fig. 6(a)), air flow (fig. 6(c)), and specific fuel consumption based on net thrust (fig. 6(e)).

Raising the flight Mach number from 0.25 to 0.53 decreased net thrust (fig. 6(b)) throughout the entire range of engine speeds presented. As flight Mach number was increased beyond 0.53, net thrust decreased at low engine speeds and increased at high engine speeds.

As the flight Mach number was raised, the fuel consumption (fig. 6(d)) increased at engine speeds above 10,000 rpm and decreased at lower engine speeds. The fuel-air ratio (fig. 6(f)) decreased at all engine speeds as the flight Mach number was raised from 0.25 to 0.86 but increased at high engine speeds with a further increase in flight Mach number.

Throughout the range of engine speeds, the exhaust-nozzle-outlet temperature (fig. 6(g)) decreased for flight Mach numbers up to and including 0.86 but increased slightly at high engine speeds with a further increase in flight Mach number.

Generalized Performance

The altitude performance data that were presented in figures 5 and 6 have been generalized to standard sea-level conditions by use of the factors δ, ratio of absolute ambient static pressure to absolute static pressure corresponding to NACA standard atmosphere at sea level, and θ, ratio of absolute ambient static temperature to absolute static temperature corresponding to NACA standard atmosphere at sea level. The generalized performance data are presented in figures 7 and 8. The concept of flow similarity and the application of dimensional analysis to the performance of turbojet engines has led to the development of these factors with which data obtained at several altitudes may be generalized. In the development of this method of generalization, the efficiencies of the engine components were considered to be unaffected by changes in altitude.

Effect of altitude. - The effect of altitude on generalized engine performance is shown in figure 7 for data obtained at a constant flight Mach number of 0.25 and altitudes from 5000 to 45,000 feet.

Jet thrust, net thrust, and air flow were the only performance data that generalized to a single curve at any engine speed or altitude for which data were obtained. Application of the generalization factors corrected the jet thrust (fig. 7(a)) and net thrust (fig. 7(b)) to a single curve at altitudes up to 15,000 feet for all engine speeds. At corrected engine speeds below 10,500 rpm, the jet thrust and net thrust generalized to a single curve at altitudes up to 25,000 feet. For all engine speeds, the corrected jet thrust and corrected net thrust increased as the altitude was raised above 25,000 feet. The air flow (fig. 7(c)) generalized to a single curve at altitudes up to 25,000 feet for all engine speeds; increase in altitude above 25,000 feet decreased the corrected air flow at all engine speeds.

Corrected fuel consumption (fig. 7(d)), corrected specific fuel consumption based on net thrust (fig. 7(e)), corrected fuel-air ratio (fig. 7(f)), and corrected exhaust-nozzle-outlet total temperature (fig. 7(g)) increased markedly as the altitude was raised.

Failure of the thrust and air-flow data to generalize for all altitudes and corrected engine speeds is attributed to the change in compressor efficiency with altitude. Failure of variables depending upon fuel consumption (figs. 7(d) to 7(g)) to generalize

to a single curve for any engine speed or altitude at which data were obtained is attributed to changes in compressor and combustion efficiency with altitude.

Effect of flight Mach number. - The effect of flight Mach number on engine performance generalized to standard sea-level conditions is shown in figure 8 for data obtained at an altitude of 25,000 feet and at flight Mach numbers from 0.25 to 1.07. The effect of flight Mach number on the generalized performance was similar to the effect on the engine performance data presented in figure 5. The data presented in figure 8 do not represent the absolute generalized sea-level performance of the engine inasmuch as the application of the generalization factors did not correct the performance data for various altitudes to a single curve.

Comparison of original and modified engine performance. - Data showing the percentage change in the corrected values of net thrust and specific fuel consumption based on net thrust for the modified engine as compared to the original engine for several specific operating conditions are presented in the following table:

(a) Corrected engine speed, 13,000 rpm[a]; altitude, 25,000 feet.

Flight Mach number	Corrected net thrust (lb)		Change in corrected net thrust (percent)	Corrected specific fuel consumption based on net thrust, (lb)/(hr)(lb thrust)		Change in corrected specific fuel consumption based on net thrust (percent)
	Original engine	Modified engine		Original engine	Modified engine	
0.25	2925	3150	8	1.250	1.225	-2
.53	2760	3040	10	1.370	1.355	-1
.73	2760	3040	10	1.400	1.400	0
.86	2925	3210	10	1.445	1.445	0
1.07	3050	3490	14	1.510	1.560	3

[a]Engine speeds are the maximum speeds at which data were obtained over the complete range of test conditions.

(b) Corrected engine speed, 12,000 rpm[a]; flight Mach number, 0.25.

Altitude (ft)	Corrected net thrust (lb)		Change in corrected net thrust (percent)	Corrected specific fuel consumption based on net thrust, (lb)/(hr)(lb thrust)		Change in corrected specific fuel consumption based on net thrust (percent)
	Original engine	Modified engine		Original engine	Modified engine	
5,000	2200	2320	5	1.175	1.165	-1
15,000	2200	2320	5	1.220	1.200	-2
25,000	2200	2400	9	1.280	1.230	-4
35,000	2340	2480	6	1.365	1.365	0
45,000	2525	2810	11	1.540	1.490	-3

[a]Engine speeds are the maximum speeds at which data were obtained over the complete range of test conditions.

SUMMARY OF RESULTS

The following results were obtained from the altitude-wind-tunnel investigation of the modified X24C-4B turbojet engine at simulated altitudes from 5000 to 45,000 feet, simulated flight Mach numbers from 0.25 to 1.07, and engine speeds from 4000 to 12,500 rpm:

1. The average temperature pattern at the turbine outlet for the modified engine conformed more closely to the manufacturer's desired temperature distribution than did the original configuration.

2. A comparison of original and modified engine performance data showed that with the modified configuration a thrust increase of from 5 to 14 percent based on original engine output was obtained for several specific operating conditions.

3. Application of the generalization factors showed that performance variables depending upon fuel consumption that are obtained at one altitude cannot be used in predicting the values of these variables at any other altitude; however, thrust and air-flow values can be predicted for a limited range of altitudes from data taken at one altitude.

4. The specific fuel consumption based on net thrust increased at all engine speeds at a flight Mach number of 0.25 when the altitude was raised above 25,000 feet. Increasing the flight Mach number raised the specific fuel consumption based on net thrust at all engine speeds.

Flight Propulsion Research Laboratory,
National Advisory Committee for Aeronautics,
Cleveland, Ohio, December 22, 1947.

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TABLE I - PERFORMANCE DATA FOR MODIFIED X24C-4B TURBOJET ENGINE WITH 170.6-SQUARE-INCH EXHAUST NOZZLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Run	Altitude (ft)	Ram-pressure ratio, P_2/p_0	Flight Mach number, M_0	Tunnel static pressure p_0 (lb/sq ft abs.)	Tunnel temperature, T_0 (°R)	Engine speed, N (rpm)	Compressor-inlet indicated temperature $T_{i,2}$ (°R)	Calculated jet thrust F_j (lb)	Scale jet thrust, F_j (lb)	Net thrust, F_n, (lb)	Cowl-inlet air flow $W_{a,1}$ (lb/sec)	Exhaust-nozzle-outlet air flow, $W_{a,8}$ (lb/sec)	Fuel consumption, W_f (lb/hr)	Specific fuel consumption based on net thrust, W_f/F_n (lb/(hr)(lb thrust))	Fuel-air ratio, f/a	Exhaust-nozzle-outlet total temperature T_8 (°R)	Corrected engine speed $N/\sqrt{\theta}$ (rpm)	Corrected jet thrust F_j/δ (lb)	Corrected net thrust F_n/δ (lb)	Corrected cowl-inlet air flow, $(W_{a,1}\sqrt{\theta})/\delta$ (lb/sec)	Corrected fuel consumption $W_f/(\delta\sqrt{\theta})$ (lb/hr)	Corrected specific fuel consumption based on net thrust, $W_f/(F_n\sqrt{\theta})$ (lb/(hr)(lb thrust))	Corrected fuel-air ratio $(f/a)/\theta$	Corrected exhaust-nozzle-outlet total temperature T_8/θ (°R)
1	5,000	1.009	0.09	1753	466	4,000	502	113	107	65	10.81	10.57	481	7.400	0.0124	1218	4,072	129	78	12.82	591	7.577	0.0128	1262
2	5,000	1.010	.09	1752	469	5,000	504	185	178	126	12.90	13.45	598	4.746	.0129	1219	5,080	215	152	15.34	734	4.829	.0133	1258
3	5,000	1.011	.10	1752	469	6,000	504	287	279	205	17.50	16.92	709	3.459	.0113	1204	6,102	337	248	20.79	871	3.512	.0116	1245
4	5,000	1.012	.10	1752	469	7,000	506	426	413	317	21.53	20.87	819	2.584	.0106	1184	7,105	499	383	25.62	1004	2.621	.0109	1220
5	5,000	1.012	.10	1752	474	8,000	505	627	625	509	26.09	25.62	935	1.837	.0100	1168	8,128	755	615	31.02	1148	1.867	.0103	1205
6	5,000	1.014	.11	1752	477	9,000	504	933	904	751	31.58	31.42	1143	1.522	.0101	1188	9,153	1092	907	37.51	1404	1.548	.0104	1228
7	5,000	1.016	.11	1752	478	10,000	507	1331	1292	1095	37.88	37.58	1374	1.255	.0101	1207	10,140	1561	1323	45.13	1683	1.272	.0104	1241
8	5,000	1.019	.13	1753	477	11,000	505	1896	1894	1644	44.57	43.63	1850	1.125	.0115	1316	11,187	2286	1984	52.90	2271	1.145	.0119	1361
9	5,000	1.022	.16	1753	464	11,500	505	2201	2188	1905	46.99	46.31	2142	1.124	.0127	1381	11,696	2641	2299	55.77	2629	1.144	.0131	1428
10	5,000	1.022	.16	1752	486	12,000	505	2487	2446	2152	48.87	48.46	2415	1.122	.0137	1448	12,204	2955	2600	58.05	2967	1.141	.0142	1497
11	5,000	1.024	.18	1753	486	12,440	500	2794	2752	2433	50.34	50.43	2786	1.145	.0152	1523	12,714	3322	2937	60.16	3437	1.170	.0159	1590
12	5,000	1.041	.24	1752	469	4,000	514	117	121	30	11.00	11.36	420	14.00	.0106	1079	4,044	146	36	13.14	513	14.250	.0108	1103
13	5,000	1.042	.24	1746	471	5,000	514	191	189	72	14.04	14.61	525	7.292	.0104	1115	5,055	229	87	16.83	643	7.391	.0106	1140
14	5,000	1.041	.24	1753	470	6,000	511	302	296	149	17.84	18.20	648	4.349	.0101	1146	6,084	357	180	21.24	793	4.406	.0104	1179
15	5,000	1.041	.24	1752	474	7,000	511	439	438	257	21.98	21.33	746	2.903	.0094	1153	7,098	529	310	26.19	914	2.948	.0097	1185
16	5,000	1.040	.24	1753	473	8,000	510	640	643	430	26.20	26.61	884	2.056	.0094	1141	8,120	776	519	31.16	1083	2.087	.0097	1175
17	5,000	1.044	.25	1767	474	9,000	501	1006	966	687	33.18	33.97	1060	1.545	.0089	1139	9,216	1157	822	38.82	1300	1.582	.0093	1195
18	5,000	1.046	.26	1767	474	10,000	500	1449	1428	1078	40.54	40.56	1348	1.250	.0092	1173	10,250	1711	1291	47.38	1655	1.282	.0097	1232
19	5,000	1.047	.26	1760	477	11,000	494	2044	1989	1584	46.84	47.09	1785	1.127	.0106	1270	11,352	2391	1904	54.56	2214	1.163	.0113	1352
20	5,000	1.048	.26	1760	479	11,000	501	1989	1933	1528	46.00	46.05	1800	1.178	.0109	1286	11,275	2323	1837	53.94	2218	1.207	.0114	1350
21	5,000	1.048	.26	1760	484	11,500	501	2312	2254	1823	48.07	48.71	2081	1.142	.0116	1358	11,788	2709	2191	57.43	2564	1.170	.0124	1427
22	5,000	1.052	.27	1760	489	12,000	502	2639	2569	2104	50.79	51.04	2405	1.143	.0132	1439	12,288	3088	2529	59.62	2960	1.170	.0138	1510
23	5,000	1.053	.27	1760	496	12,500	504	2979	2859	2373	52.35	52.64	2766	1.166	.0147	1522	12,775	3437	2852	61.57	3398	1.191	.0153	1590
24	15,000	1.039	.24	1190	454	4,000	474	87	84	18	8.56	8.50	390	21.67	.0126	1029	4,208	149	32	14.47	729	22.781	.0140	1149
25	15,000	1.042	.24	1189	458	5,000	469	146	137	49	11.01	10.83	441	9.000	.0111	1046	5,290	244	87	18.52	831	9.552	.0125	1170
26	15,000	1.038	.23	1197	450	6,000	474	224	220	120	13.08	13.28	532	4.433	.0113	1079	6,312	389	212	21.98	989	4.665	.0125	1194
27	15,000	1.043	.24	1189	458	8,000	460	501	472	313	19.60	19.76	693	2.214	.0098	1079	8,470	840	557	33.10	1306	2.345	.0110	1210
28	15,000	1.040	.24	1197	456	8,000	473	484	473	321	19.40	19.66	693	2.159	.0099	1072	8,424	836	568	32.57	1290	2.271	.0110	1187
29	15,000	1.043	.24	1190	455	9,000	475	739	710	513	24.20	24.61	793	1.546	.0091	1073	9,468	1262	912	40.90	1483	1.626	.0101	1187
30	15,000	1.046	.26	1190	453	10,000	475	1064	1021	779	28.78	29.01	996	1.279	.0096	1144	10,520	1815	1385	48.64	1863	1.345	.0106	1267
31	15,000	1.048	.26	1190	465	11,000	474	1497	1449	1165	33.13	33.16	1323	1.136	.0111	1273	11,583	2576	2071	55.94	2477	1.196	.0123	1411

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32	15,000	1.049	0.26	1190	463	11,500	474	1718	1675	1373	34.86	34.95	1532	1.116	0.0122	1344	12,110	2978	2441	58.86	2868	1.175	0.0135	1491
33	15,000	1.051	.27	1190	471	12,000	474	1943	1897	1578	36.20	36.38	1790	1.134	.0137	1429	12,648	3373	2806	61.07	3354	1.195	.0153	1587
34	15,000	1.053	.27	1190	476	12,500	480	2151	2114	1781	36.76	37.21	2030	1.140	.0153	1537	13,088	3759	3167	62.43	3779	1.193	.0168	1687
35	15,000	1.204	.52	1190	464	4,000	495	96	78	-103	10.50	11.49	320	(a)	.0085	655	4,208	139	-183	17.75	599	(a)	.0094	725
36	15,000	1.208	.53	1190	464	5,000	499	156	131	-96	13.02	13.57	385	(a)	.0082	743	5,235	233	-171	22.11	717	(a)	.0090	824
37	15,000	1.208	.53	1190	465	6,000	499	245	240	-36	15.31	15.77	461	(a)	.0081	832	6,282	427	-64	26.85	858	(a)	.0089	912
38	15,000	1.206	.53	1190	466	7,000	498	363	338	21	18.25	18.74	537	25.571	.0082	871	7,343	601	37	30.93	1002	27.081	.0090	958
39	15,000	1.204	.52	1190	463	8,000	501	523	500	124	21.70	21.79	625	5.04	.0080	927	8,360	889	220	36.92	1161	5.277	.0087	1012
40	15,000	1.209	.53	1186	468	9,000	490	817	811	339	27.21	27.24	736	2.171	.0076	964	9,522	1447	605	45.68	1389	2.296	.0084	1079
41	15,000	1.207	.53	1186	469	10,000	491	1181	1167	614	32.02	31.70	962	1.567	.0083	1056	10,560	2082	1095	54.09	1812	1.655	.0093	1177
42	15,000	1.212	.53	1186	472	11,000	490	1715	1675	1029	36.98	36.32	1374	1.335	.0103	1215	11,638	2988	1836	62.56	2593	1.412	.0116	1360
43	15,000	1.213	.53	1186	472	11,500	497	1983	1934	1257	38.15	37.77	1647	1.310	.0119	1328	12,087	3450	2242	65.27	3088	1.377	.0131	1467
44	15,000	1.209	.53	1186	473	12,000	500	2238	2218	1508	40.45	39.16	1950	1.293	.0134	1421	12,552	3957	2690	68.99	3639	1.353	.0147	1555
45	15,000	1.212	.53	1186	472	12,500	500	2530	2474	1749	41.13	40.62	2275	1.301	.0154	1536	13,088	4414	3120	70.08	4249	1.362	.0168	1683
46	15,000	1.436	.74	1183	476	5,000	508	176	153	-214	15.24	16.76	340	(a)	.0062	595	5,320	274	-383	25.62	647	(a)	.0070	674
47	15,000	(a)	(a)	1197	501	6,000	533	(a)	(a)	(a)	(a)	(a)	395	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
48	15,000	1.429	.73	1190	480	7,000	531	396	385	-139	21.43	21.27	446	(a)	.0058	754	7,287	685	-247	36.60	826	(a)	.0063	817
49	15,000	1.426	.73	1190	479	8,000	512	610	607	-12	25.90	25.15	563	(a)	.0061	804	8,472	1079	-21	43.32	1060	(a)	.0068	901
50	15,000	1.425	.73	1190	479	9,000	512	913	892	148	31.04	30.46	688	4.649	.0062	875	9,531	1586	263	52.11	1295	4.924	.0069	981
51	15,000	1.423	.73	1190	482	10,000	512	1353	1318	457	36.01	35.63	920	2.013	.0071	981	10,590	2343	813	60.16	1732	2.130	.0080	1100
52	15,000	1.418	.73	1190	486	11,000	512	1994	1976	994	41.34	40.38	1449	1.458	.0097	1180	11,638	3513	1767	69.47	2726	1.543	.0109	1320
53	15,000	1.413	.72	1190	495	11,500	515	2368	2326	1299	43.24	42.37	1825	1.405	.0117	1315	12,121	4136	2310	72.94	3429	1.481	.0130	1461
54	15,000	1.419	.73	1190	503	12,000	521	2689	2645	1564	44.97	43.98	2161	1.382	.0133	1431	12,588	4703	2781	76.22	4031	1.449	.0147	1574
55	15,000	(a)	(a)	1190	515	12,500	527	(a)	(a)	(a)	(a)	(a)	2494	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
56	15,000	(a)	(a)	1190	519	12,500	533	(a)	(a)	(a)	(a)	(a)	2484	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
57	25,000	1.042	.24	778	483	4,000	448	72	61	16	5.75	6.14	283	17.69	.0137	1068	4,332	166	44	14.44	834	18.055	.0160	1253
58	25,000	1.041	.24	778	487	5,000	449	98	102	45	7.54	6.91	345	7.667	.0131	1068	5,405	277	122	18.47	1014	8.311	.0152	1248
59	25,000	1.041	.24	778	491	6,000	447	157	161	89	9.39	8.90	405	4.551	.0120	1055	6,504	438	242	23.56	1194	4.934	.0141	1240
60	25,000	1.042	.24	778	494	7,000	447	229	232	144	11.34	10.33	461	3.201	.0113	1042	7,588	631	392	28.45	1359	3.467	.0133	1224
61	25,000	1.046	.26	778	462	8,000	445	351	343	230	13.54	13.46	542	2.357	.0109	1049	8,688	933	626	34.66	1601	2.558	.0128	1237
62	25,000	1.044	.25	778	464	9,000	442	545	528	393	16.90	17.04	633	1.611	.0104	1057	9,774	1436	1069	42.33	1870	1.749	.0123	1246
63	25,000	1.049	.26	778	466	10,000	442	782	779	608	20.50	20.14	763	1.255	.0103	1125	10,910	2119	1654	51.11	2264	1.369	.0123	1339
64	25,000	1.051	.27	777	475	11,000	442	1091	1076	879	23.17	22.79	991	1.127	.0119	1277	12,001	2930	2394	57.33	2944	1.230	.0141	1520
65	25,000	1.051	.27	781	483	11,500	442	1259	1242	1036	24.24	24.00	1159	1.119	.0133	1362	12,547	3365	2807	60.19	3426	1.221	.0158	1621
66	25,000	1.047	.26	784	492	12,000	442	1420	1395	1191	24.91	24.72	1346	1.130	.0150	1483	13,092	3765	3215	61.62	3963	1.233	.0179	1765
67	25,000	1.049	.26	781	506	12,260	447	1497	1465	1257	24.92	24.74	1462	1.163	.0163	1565	13,376	3969	3405	61.88	4371	1.269	.0194	1862
68	25,000	1.206	.53	778	461	4,000	452	73	76	-52	7.71	7.79	240	(a)	.0090	678	4,404	207	-141	19.05	746	(a)	.0109	822
69	25,000	1.207	.53	778	463	5,000	452	118	120	-28	8.94	9.34	325	(a)	.0101	720	5,505	326	-76	22.09	973	(a)	.0122	873
70	25,000	1.202	.52	781	451	6,000	465	182	114	-5	10.91	11.19	395	(a)	.0101	822	6,510	309	-184	27.24	1161	(a)	.0118	967
71	25,000	1.209	.53	781	467	7,000	454	281	274	50	13.40	13.61	436	4.233	.0090	843	7,693	886	279	33.05	1298	4.652	.0109	1018
72	25,000	1.207	.53	781	453	8,000	465	400	393	132	15.49	15.93	512	3.879	.0092	897	8,680	1065	458	38.68	1505	4.204	.0108	1056
73	25,000	1.210	.53	781	454	9,000	465	602	586	263	19.06	19.46	583	2.217	.0085	940	9,774	1587	712	47.54	1715	2.409	.0100	1108
74	25,000	1.211	.53	781	458	10,000	466	884	861	477	22.60	22.66	779	1.528	.0090	1054	10,950	2332	1292	56.43	2143	1.659	.0105	1341
75	25,000	1.210	.53	781	458	11,000	465	1248	1212	778	25.63	25.62	1001	1.287	.0109	1216	11,946	3283	2108	63.93	2945	1.397	.0128	1434
76	25,000	1.220	.54	774	460	11,500	465	1446	1419	954	26.91	26.71	1177	1.234	.0121	1321	12,501	3880	2608	67.68	3498	1.341	.0144	1361
77	25,000	1.207	.53	774	460	12,000	465	1621	1570	1109	27.37	27.58	1379	1.243	.0140	1425	13,020	4292	3032	68.97	4090	1.349	.0165	1677
78	25,000	1.209	.53	781	466	12,500	465	1833	1773	1298	28.13	28.53	1645	1.267	.0162	1567	13,575	4803	3516	70.17	4840	1.377	.0192	1847
79	25,000	1.202	.52	796	506	12,500	491	1720	1566	1195	27.53	27.70	1542	1.290	.0156	1554	13,188	4428	3176	69.36	4324	1.361	.0174	1730

[a]Data not obtained.

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TABLE I - PERFORMANCE DATA FOR MODIFIED X24C-4B TURBOJET ENGINE WITH 170-SQUARE-INCH EXHAUST NOZZLE - Concluded

Run	1 Altitude (ft)	2 Ram-pressure ratio, P_2/p_0	3 Flight Mach number, M_0	4 Tunnel static pressure p_0 (lb/sq ft abs.)	5 Tunnel temperature, T_0 (°R)	6 Engine speed, N (rpm)	7 Compressor-inlet indicated temperature $T_{i,2}$ (°R)	8 Calculated jet thrust F_j (lb)	9 Scale jet thrust, F_j (lb)	10 Net thrust, F_n (lb)	11 Cowl-inlet air flow $W_{a,1}$ (lb/sec)	12 Exhaust-nozzle-outlet air flow, $W_{a,8}$ (lb/sec)	13 Fuel consumption, W_f (lb/hr)	14 Specific fuel consumption based on net thrust, W_f/F_n (lb/(hr)(lb thrust))	15 Fuel-air ratio, f/a	16 Exhaust-nozzle-outlet total temperature, T_8 (°R)	17 Corrected engine speed $N/\sqrt{\theta}$ (rpm)	18 Corrected jet thrust F_j/δ (lb)	19 Corrected net thrust F_n/δ (lb)	20 Corrected cowl-inlet air flow, $(W_{a,1}\sqrt{\theta})/\delta$ (lb/sec)	21 Corrected fuel consumption $W_f/(\delta\sqrt{\theta})$ (lb/hr)	22 Corrected specific fuel consumption based on net thrust, $W_f/(F_n\sqrt{\theta})$ (lb/(hr)(lb thrust))	23 Corrected fuel-air ratio $(f/a)\theta$	24 Corrected exhaust-nozzle-outlet total temperature T_8/θ (°R)
80	25,000	1.420	0.73	778	463	5,000	469	119	117	-129	10.80	11.10	315	(a)	0.0081	569	5,530	318	-351	26.56	948	(a)	0.0099	696
81	25,000	1.408	.72	781	453	6,000	473	200	174	-113	12.66	13.27	390	(a)	.0086	648	6,600	471	-306	31.18	1162	(a)	.0104	785
82	25,000	1.416	.72	781	467	7,000	471	305	307	-51	15.76	15.63	395	(a)	.0070	701	7,728	832	-138	38.67	1181	(a)	.0085	855
83	25,000	1.411	.72	781	458	8,000	473	472	462	39	18.62	18.61	476	12.205	.0071	794	8,800	1252	106	45.86	1418	13.377	.0086	961
84	25,000	1.424	.73	781	459	9,000	473	710	687	176	22.21	22.36	563	3.199	.0070	854	9,909	1861	477	54.65	1679	3.520	.0085	1035
85	25,000	1.431	.74	788	457	10,000	471	1081	1046	434	26.51	26.62	729	1.680	.0076	972	11,050	2809	1165	64.42	2163	1.857	.0093	1187
86	25,000	1.418	.73	788	462	11,000	475	1548	1486	804	29.79	29.70	1079	1.342	.0101	1189	12,089	3990	2159	72.78	3184	1.475	.0122	1436
87	25,000	1.428	.73	774	461	11,500	474	1790	1719	1006	30.87	30.87	1292	1.284	.0116	1307	12,662	4700	2750	76.66	3889	1.414	.0141	1584
88	25,000	1.415	.72	788	464	12,000	473	2022	1956	1223	32.18	32.40	1547	1.265	.0134	1408	13,212	5252	3284	78.48	4573	1.393	.0162	1706
89	25,000	1.426	.73	788	469	12,500	473	2257	2183	1417	33.26	33.57	1845	1.302	.0154	1517	13,775	5861	3805	81.04	5459	1.435	.0187	1842
90	25,000	1.622	.86	781	459	6,000	497	220	191	-210	14.66	15.56	360	(a)	.0068	523	6,570	517	-569	36.27	1068	(a)	.0082	627
91	25,000	1.630	.87	781	462	7,000	492	328	320	-164	17.71	17.19	395	(a)	.0062	630	7,707	867	-444	43.58	1178	(a)	.0075	764
92	25,000	1.627	.86	781	463	8,000	492	505	498	-69	20.79	20.25	441	(a)	.0059	707	8,808	1349	-187	51.15	1315	(a)	.0071	857
93	25,000	1.635	.87	781	462	9,000	492	802	788	106	24.91	24.38	537	5.066	.0060	802	9,918	2135	287	61.24	1603	5.585	.0073	974
94	25,000	1.624	.86	781	472	10,000	485	1242	1212	431	28.91	29.28	729	1.691	.0070	943	11,090	3285	1169	70.62	2190	1.875	.0086	1159
95	25,000	1.628	.86	788	474	11,000	486	1836	1767	856	33.57	33.52	1152	1.346	.0095	1166	12,138	4144	2298	81.35	3427	1.491	.0117	1432
96	25,000	1.629	.86	781	481	11,500	488	2100	2029	1084	34.76	34.61	1414	1.304	.0113	1297	12,719	5497	2937	85.14	4236	1.442	.0138	1586
97	25,000	1.632	.87	788	488	12,000	489	2378	2285	1295	36.31	36.36	1700	1.313	.0130	1399	13,260	6135	3477	88.23	5044	1.451	.0159	1708
98	25,000	1.629	.86	788	495	12,500	490	2634	2549	1535	37.24	37.42	2004	1.306	.0149	1523	13,800	6844	4121	90.57	5940	1.441	.0182	1857
99	25,000	2.065	1.07	781	473	8,000	511	629	601	-244	25.33	24.91	451	(a)	.0049	599	8,944	1628	-661	61.38	1366	(a)	.0062	749
100	25,000	2.070	1.08	774	475	9,000	510	1014	980	-10	29.68	29.29	542	(a)	.0051	734	10,080	2679	-27	72.45	1660	(a)	.0064	920
101	25,000	2.052	1.07	781	476	10,000	511	1571	1528	379	34.57	33.81	803	2.119	.0065	924	11,170	4139	1027	83.94	2430	2.366	.0081	1208
102	25,000	2.055	1.07	781	483	11,000	510	2302	2251	944	39.33	38.29	1383	1.465	.0098	1178	12,298	6098	2557	95.30	4189	1.638	.0122	1473
103	25,000	2.064	1.07	781	484	11,500	511	2704	2640	1248	41.75	40.56	1750	1.402	.0116	1320	12,857	7152	3381	101.16	5300	1.568	.0146	1650
104	25,000	2.012	1.05	781	494	12,000	511	2945	2871	1479	42.43	41.47	2049	1.385	.0134	1429	13,368	7778	4007	103.18	6184	1.543	.0166	1773
105	25,000	2.035	1.06	781	498	12,500	513	3249	3195	1734	44.09	43.02	2415	1.393	.0152	1531	13,913	8735	4741	108.30	7349	1.550	.0188	1897
106	35,000	1.049	.26	493	486	5,000	455	67	73	42	3.64	4.27	266	6.333	.0203	1171	5,375	313	180	14.53	1227	6.817	.0235	1354
107	35,000	1.045	.25	493	488	6,000	454	99	103	62	5.08	5.27	325	5.242	.0178	1196	6,456	442	266	20.26	1501	5.643	.0206	1385
108	35,000	1.043	.24	493	506	7,000	456	147	160	106	6.83	6.43	360	3.396	.0146	1202	7,511	687	455	27.32	1658	3.644	.0169	1384
109	35,000	1.045	.25	493	489	8,000	460	222	218	151	8.15	8.09	415	2.748	.0141	1171	8,552	936	648	32.72	1904	2.938	.0162	1339
110	35,000	1.039	.24	493	489	9,000	458	314	332	256	9.92	9.52	476	1.359	.0133	1175	9,639	1425	1099	39.75	2188	1.991	.0153	1348

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111	35,000	1.049	0.26	493	492	10,000	458	465	476	372	12.17	11.94	547	1.470	0.0125	1195	10,710	2043	1597	48.77	2514	1.574	0.0143	1371
112	35,000	1.055	.27	493	494	11,000	456	661	663	535	14.24	13.77	683	1.277	.0133	1328	11,825	2846	2296	56.95	3151	1.372	.0154	1535
113	35,000	1.053	.27	493	498	11,500	454	774	760	627	15.10	14.62	778	1.240	.0143	1413	12,386	3259	2688	60.18	3596	1.335	.0166	1651
114	35,000	1.057	.28	493	506	12,000	453	909	895	754	15.43	15.30	920	1.220	.0166	1559	12,948	3841	3236	61.38	4261	1.317	.0193	1815
115	35,000	1.212	.53	500	473	4,000	453	62	54	-24	4.64	5.60	(a)	(a)	(a)	730	4,400	229	-102	17.85	(a)	(a)	(a)	883
116	35,000	1.201	.52	493	473	5,000	452	69	67	-21	5.36	5.39	230	(a)	.0119	854	5,500	288	-90	20.91	1086	(a)	.0144	1033
117	35,000	1.185	.50	493	476	6,000	452	112	107	1	6.74	6.74	320	320.00	.0132	866	6,582	459	4	26.37	1507	376.750	.0159	1042
118	35,000	1.209	.53	493	481	7,000	453	161	168	36	7.93	7.99	345	9.583	.0121	875	7,700	721	155	30.94	1629	10.510	.0146	1059
119	35,000	1.205	.53	493	465	8,000	446	260	251	83	10.23	10.03	405	4.880	.0110	896	8,864	1077	356	39.63	1926	5.410	.0135	1100
120	35,000	1.201	.52	493	468	9,000	446	399	396	198	12.19	12.27	471	2.379	.0107	959	9,972	1700	850	47.22	2240	2.635	.0132	1178
121	35,000	1.209	.53	493	470	10,000	447	592	586	345	14.54	14.46	583	1.690	.0111	1072	11,080	2515	1481	56.32	2772	1.872	.0137	1316
122	35,000	1.207	.53	493	467	11,000	447	846	834	559	16.70	16.34	773	1.383	.0129	1267	12,166	3580	2399	64.81	3669	1.529	.0157	1550
123	35,000	1.207	.53	493	483	11,500	449	971	966	682	17.20	17.00	894	1.311	.0144	1379	12,696	4146	2927	66.07	4236	1.447	.0176	1581
124	35,000	1.211	.53	493	489	12,000	449	1111	1097	801	17.74	17.59	1050	1.311	.0164	1514	13,260	4708	3438	68.91	4980	1.449	.0201	1847
125	35,000	1.206	.53	500	495	12,159	450	1148	1138	841	17.98	17.83	1099	1.307	.0170	1557	13,399	4816	3559	69.05	5126	1.440	.0206	1890
126	35,000	1.404	.72	500	464	5,000	446	80	88	-66	7.03	6.79	340	(a)	.0134	598	5,660	372	-279	26.28	1629	(a)	.0172	766
127	35,000	1.420	.73	493	468	6,000	446	133	135	-50	8.31	8.74	325	(a)	.0109	617	6,810	579	-215	31.42	1583	(a)	.0140	795
128	35,000	1.412	.72	493	472	7,000	445	213	200	-20	9.99	10.40	365	(a)	.0102	694	7,945	858	-86	37.78	1778	(a)	.0131	894
129	35,000	1.420	.73	493	474	8,000	445	313	302	31	12.20	12.00	410	13.226	.0093	769	9,080	1296	133	46.13	1997	1.502	.0120	990
130	35,000	1.424	.73	493	470	9,000	441	504	495	159	15.12	14.78	481	3.025	.0088	857	10,269	2125	682	56.88	2356	3.455	.0115	1116
131	35,000	1.428	.73	493	471	10,000	441	765	764	368	17.78	17.43	618	1.679	.0097	998	11,420	3279	1579	66.82	3029	1.918	.0126	1301
132	35,000	1.430	.73	493	474	11,000	441	1090	1073	626	20.01	19.59	859	1.372	.0119	1213	12,562	4605	2687	75.20	4210	1.567	.0156	1582
133	35,000	1.422	.73	493	481	11,500	441	1261	1237	778	20.71	20.44	1021	1.312	.0137	1345	13,122	5309	3339	77.90	5000	1.497	.0178	1751
134	35,000	1.422	.73	500	487	12,000	443	1434	1398	920	21.52	21.33	1211	1.316	.0156	1480	13,656	5916	3893	80.03	5832	1.498	.0202	1917
135	35,000	(a)	(a)	500	499	12,295	445	(a)	(a)	(a)	(a)	(a)	1302	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
136	45,000	1.046	.26	303	472	9,000	455	203	195	147	5.79	5.96	365	2.483	.0175	1242	9,675	1362	1027	37.61	2740	2.668	.0202	1436
137	45,000	1.059	.28	303	441	10,000	448	326	332	261	7.67	7.75	421	1.613	.0152	1239	10,850	2318	1823	49.36	3190	1.750	.0180	1458
138	45,000	1.059	.28	303	454	11,000	453	453	466	386	8.61	8.56	552	1.430	.0178	1462	11,869	3254	2695	55.72	4159	1.543	.0207	1702
139	45,000	1.050	.27	303	449	11,220	450	488	493	419	8.68	8.78	568	1.356	.0182	1514	12,129	3443	2926	56.07	4288	1.465	.0212	1770
140	45,000	1.208	.53	303	482	4,000	453	22	27	-12	2.35	1.96	(a)	(a)	(a)	841	4,400	189	-84	14.92	(a)	(a)	(a)	1018
141	45,000	1.201	.52	303	483	5,000	453	48	43	1	2.57	3.14	192	192	.0207	920	5,495	300	7	16.33	1473	210.4	.0251	1111
142	45,000	1.198	.52	303	485	6,000	455	64	71	1	4.27	3.64	220	220	.0143	958	6,576	496	7	27.21	1684	240.6	.0172	1151
143	45,000	1.201	.52	303	488	7,000	460	95	104	19	5.14	4.50	255	13.42	.0138	992	7,630	726	133	32.93	1941	14.59	.0164	1178
144	45,000	1.190	.51	310	491	8,000	453	154	158	62	5.98	5.91	305	4.919	.0142	1011	8,776	1079	423	37.21	2284	5.400	.0171	1216
145	45,000	1.198	.52	303	492	9,000	454	233	240	119	7.43	6.90	340	2.857	.0127	1075	9,873	1676	831	47.30	2605	3.135	.0153	1293
146	45,000	1.246	.58	289	475	10,000	450	383	384	237	8.21	8.40	426	1.797	.0144	1212	11,080	2812	1735	54.25	3456	1.992	.0177	1488
147	45,000	1.190	.51	310	482	11,000	452	560	546	386	10.03	10.00	578	1.497	.0160	1421	12,089	3727	2635	62.30	4336	1.646	.0193	1717
148	45,000	1.220	.54	303	488	11,500	450	647	646	464	10.67	10.20	658	1.418	.0171	1586	12,708	4511	3240	67.43	5077	1.567	.0209	1937
149	45,000	1.382	.70	317	493	4,500	452	38	37	-35	3.36	3.96	(a)	(a)	(a)	573	5,049	247	-234	19.99	(a)	(a)	(a)	721
150	45,000	1.406	.72	303	500	5,000	453	52	50	-43	4.22	4.15	(a)	(a)	(a)	680	5,620	349	-300	26.22	(a)	(a)	(a)	859
151	45,000	1.413	.72	303	468	6,000	439	79	98	-14	5.13	4.90	255	(a)	.0138	703	6,852	684	-98	31.37	2034	(a)	.0180	917
152	45,000	1.465	.76	303	475	7,000	440	143	139	-2	6.14	6.61	294	(a)	.0133	709	8,036	971	-14	37.35	2357	(a)	.0175	934
153	45,000	1.396	.71	303	484	8,000	441	200	201	49	7.04	7.23	335	6.837	.0132	840	9,104	1404	342	43.20	2662	7.784	.0171	1088
154	45,000	1.397	.71	310	483	9,000	441	318	316	117	9.22	9.02	390	3.333	.0117	908	10,242	2157	799	55.30	3030	3.792	.0152	1176
155	45,000	1.396	.71	303	482	10,000	446	455	449	232	10.01	9.85	451	1.944	.0125	1086	11,320	3135	1620	61.75	3565	2.201	.0160	1391
156	45,000	1.380	.70	303	494	11,000	459	646	627	383	11.25	10.92	588	1.535	.0145	1395	12,243	4378	2674	70.58	4570	1.709	.0180	1728
157	45,000	1.409	.72	303	502	11,500	454	806	789	522	12.00	12.01	739	1.416	.0171	1540	12,903	5510	3645	74.68	5790	1.588	.0215	1939
158	45,000	1.413	.72	303	509	11,666	453	834	827	551	12.38	12.03	768	1.394	.0172	1600	13,124	5775	3848	76.84	6033	1.568	.0218	2026

[a] Data not obtained.

TABLE II - AVERAGE PRESSURES AND TEMPERATURES THROUGHOUT MODIFIED
(Stations identified

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Run	Altitude (ft)	Ram-pressure ratio P_2/p_0	Flight Mach number M_0	Tunnel static pressure p_0 (lb/sq ft abs.)	Tunnel temperature T_0 (°R)	Engine speed, N, rpm	Net thrust, F_n (lb)	Indicated temperature $T_{1,1}$ (°R)	Total pressure, P_1 (lb/sq ft abs.)	Static pressure, p_1 (lb/sq ft abs.)	Indicated temperature $T_{1,2}$ (°R)	Total pressure, P_2 (lb/sq ft abs.)	Total pressure, P_2 (lb/sq ft abs.)[a]	Static pressure, p_2 (lb/sq ft abs.)	Compressor stator-stage static pressure, p_3 (lb/sq ft abs.)					
															1	2	3	4	5	6
1	5,000	1.009	.09	1753	466	4,000	65	498	1767	1758	502	1768	1768	1762	1781	1809	1837	1866	1887	1908
2	5,000	1.010	.09	1752	469	5,000	126	499	1769	1756	504	1769	1769	1759	1787	1829	1879	1914	1949	1991
3	5,000	1.011	.10	1752	469	6,000	205	498	1771	1749	504	1771	1771	1755	1794	1865	1935	1984	2041	2104
4	5,000	1.012	.10	1752	469	7,000	317	502	1773	1739	506	1773	1773	1748	1794	1893	1984	2055	2139	2231
5	5,000	1.012	.10	1752	474	8,000	509	502	1775	1724	505	1773	1774	1737	1787	1921	2048	2139	2266	2407
6	5,000	1.014	.11	1752	477	9,000	751	501	1778	1702	504	1776	1778	1720	1808	1963	2111	2245	2428	2618
7	5,000	1.016	.11	1752	478	10,000	1095	504	1784	1670	507	1780	1783	1695	1780	1942	2146	2350	2604	2878
8	5,000	1.019	.13	1753	477	11,000	1644	501	1795	1635	505	1786	1792	1670	1676	1837	2105	2380	2703	3034
9	5,000	1.022	.16	1753	484	11,500	1905	502	1797	1616	505	1791	1795	1657	1598	1753	2035	2337	2717	3077
10	5,000	1.022	.16	1757	486	12,000	2152	503	1798	1599	505	1791	1795	1645	1520	1660	1942	2259	2667	3047
11	5,000	1.024	.18	1753	486	12,440	2433	499	1803	1587	500	1795	1800	1637	1443	1570	1845	2175	2612	3013
12	5,000	1.041	.24	1752	469	4,000	30	513	1824	1815	514	1824	1821	1817	1829	1865	1893	1914	1935	1970
13	5,000	1.042	.24	1746	471	5,000	72	512	1820	1805	514	1819	1815	1809	1823	1880	1922	1957	1999	2042
14	5,000	1.041	.24	1753	470	6,000	149	509	1826	1802	511	1825	1825	1807	1852	1922	1992	2042	2105	2168
15	5,000	1.041	.24	1752	474	7,000	257	510	1825	1790	511	1823	1820	1797	1836	1942	2041	2111	2196	2294
16	5,000	1.040	.24	1753	473	8,000	430	508	1824	1772	510	1823	1824	1785	1845	1978	2105	2204	2330	2464
17	5,000	1.044	.25	1767	474	9,000	687	499	1847	1765	501	1844	1845	1783	1873	2035	2189	2330	2541	2746
18	5,000	1.046	.26	1767	474	10,000	1078	499	1853	1729	500	1848	1850	1758	1837	2006	2232	2450	2717	2999
19	5,000	1.047	.26	1760	477	11,000	1584	493	1850	1680	494	1843	1847	1720	1718	1880	2168	2450	2802	3147
20	5,000	1.048	.26	1760	479	11,000	1528	500	1852	1686	501	1845	1849	1725	1725	1894	2175	2450	2795	3133
21	5,000	1.048	.26	1760	484	11,500	1823	500	1853	1664	501	1845	1648	1707	1612	1774	2056	2380	2767	3203
22	5,000	1.052	.27	1760	489	12,000	2104	502	1859	1653	502	1851	1853	1699	1570	1711	2006	2330	2760	3154
23	5,000	1.053	.27	1760	496	12,500	2373	504	1863	1640	504	1853	1858	1691	1485	1619	1901	2239	2689	3105
24	15,000	1.039	.24	1190	454	4,000	18	473	1237	1230	474	1237	1238	1233	1246	1267	1289	1303	1324	1338
25	15,000	1.042	.24	1189	458	5,000	49	469	1240	1228	469	1239	1237	1231	1245	1288	1323	1344	1372	1414
26	15,000	1.038	.23	1197	450	6,000	120	473	1242	1225	474	1242	1242	1230	1253	1310	1365	1401	1443	1500
27	15,000	1.043	.24	1189	458	8,000	313	470	1243	1203	469	1240	1239	1211	1245	1351	1435	1513	1604	1717
28	15,000	1.040	.24	1197	456	8,000	321	472	1246	1207	473	1245	1247	1216	1260	1359	1450	1521	1619	1726
29	15,000	1.043	.24	1190	455	9,000	513	474	1243	1182	475	1241	1243	1196	1267	1373	1479	1598	1753	1908
30	15,000	1.046	.26	1190	453	10,000	779	474	1248	1159	475	1245	1246	1179	1225	1345	1500	1655	1838	2042
31	15,000	1.048	.26	1190	465	11,000	1165	473	1251	1130	474	1247	1251	1159	1134	1246	1436	1648	1887	2133
32	15,000	1.049	.26	1190	463	11,500	1373	473	1253	1118	474	1248	1253	1150	1077	1176	1366	1591	1866	2126
33	15,000	1.051	.27	1190	471	12,000	1578	473	1256	1109	474	1251	1255	1144	1014	1106	1296	1528	1824	2105
34	15,000	1.053	.27	1190	476	12,500	1781	478	1259	1104	480	1253	1258	1141	958	1042	1225	1465	1774	2063
35	15,000	1.204	.52	1190	464	4,000	-103	494	1432	1422	495	1433	1427	1426	1436	1465	1486	1507	1535	1549
36	15,000	1.208	.53	1190	464	5,000	-96	498	1438	1422	499	1438	1431	1427	1443	1493	1428	1555	1591	1634
37	15,000	1.208	.53	1190	465	6,000	-36	496	1437	1414	499	1437	1431	1421	1443	1507	1556	1598	1655	1711
38	15,000	1.206	.53	1190	466	7,000	21	496	1436	1405	498	1435	1429	1412	1443	1528	1598	1655	1739	1817
39	15,000	1.204	.52	1190	463	8,000	124	499	1434	1389	501	1433	1426	1400	1450	1556	1655	1732	1852	1971
40	15,000	1.209	.53	1186	468	9,000	339	490	1436	1366	490	1434	1426	1383	1454	1566	1693	1827	1989	2165
41	15,000	1.207	.53	1186	469	10,000	614	490	1435	1336	491	1432	1424	1359	1411	1538	1721	1890	2094	2312
42	15,000	1.212	.53	1186	472	11,000	1029	488	1442	1307	490	1437	1429	1340	1320	1446	1665	1890	2158	2425
43	15,000	1.213	.53	1186	472	11,500	1257	495	1445	1296	497	1439	1432	1332	1278	1397	1615	1862	2165	2446
44	15,000	1.209	.53	1186	473	12,000	1508	498	1445	1277	500	1434	1427	1317	1207	1320	1538	1791	2122	2432
45	15,000	1.212	.53	1186	472	12,500	1749	499	1446	1271	500	1437	1438	1314	1151	1249	1468	1728	2080	2411
46	15,000	1.436	.74	1183	476	5,000	-214	508	1700	1681	508	1699	1682	1686	1697	1753	1788	1831	1873	1915
47	15,000	(c)	(c)	1197	501	6,000	(c)	533	(c)	(c)	533	(c)	(c)	(c)	1697	1767	1824	1880	1943	2007
48	15,000	1.429	.73	1190	480	7,000	-139	531	1704	1666	531	1701	1683	1673	1711	1810	1887	1964	2056	2147
49	15,000	1.426	.73	1190	479	8,000	-12	512	1700	1645	512	1697	1696	1657	1711	1838	1943	2042	2183	2316
50	15,000	1.425	.73	1190	479	9,000	148	511	1699	1620	512	1696	1696	1638	1718	1845	1993	2140	2323	2514
51	15,000	1.423	.73	1190	482	10,000	457	512	1697	1588	512	1693	1697	1612	1676	1817	2021	2204	2436	2675
52	15,000	1.418	.73	1190	486	11,000	994	512	1696	1548	512	1688	1690	1580	1584	1732	1978	2225	2528	2816
53	15,000	1.413	.72	1190	495	11,500	1299	514	1688	1522	515	1681	1684	1560	1507	1655	1915	2190	2528	2851
54	15,000	1.419	.73	1190	503	12,000	1564	521	1697	1514	521	1689	1672	1558	1458	1598	1859	2147	2521	2873
55	15,000	(c)	(c)	1190	515	12,500	(c)	528	(c)	(c)	527	(c)	(c)	(c)	1401	1317	1577	1253	2281	2647
56	15,000	(c)	(c)	1190	519	12,500	(c)	534	(c)	(c)	533	(c)	(c)	(c)	1415	1542	1802	2112	2499	2866

[a]Manufacturer's instrumentation.
[b]Data not obtained for turbine stator-stage static pressures.
[c]Data not obtained.

NACA

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X24C-4B TURBOJET ENGINE WITH 170.6-SQUARE-INCH EXHAUST NOZZLE in figure 3.)

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Compressor stator-stage static pressure, p_3 (lb/sq ft abs.)					Indicated temperature $T_{1,4}$ (°R)	Indicated temperature $T_{1,4}$ (°R)[a]	Total pressure, P_4 (lb/sq ft abs.)	Total pressure, P_4 (lb/sq ft abs.)[a]	Static pressure, p_4 (lb/sq ft abs.)	Total pressure, P_5 (lb/sq ft abs.)[b]	Total pressure, P_5 (lb/sq ft abs.)[a]	Indicated temperature $T_{1,7}$ (°R)	Indicated temperature $T_{1,7}$ (°R)[a]	Total pressure, P_7 (lb/sq ft abs.)	Total pressure, P_7 (lb/sq ft abs.)[a]	Static pressure, p_7 (lb/sq ft abs.)	Indicated temperature $T_{1,8}$ (°R)	Total pressure, P_8 (lb/sq ft abs.)	Static pressure, p_8 (lb/sq ft abs.)	Run
7	8	9	10	11																
1943	1978	1999	2013	1985	532	534	2050	2049	2032	2010	2006	1234	1306	1809	1802	1786	1216	1801	1756	1
2041	2104	2139	2174	2132	550	553	2229	2231	2201	2167	2167	1227	1301	1841	1836	1799	1217	1834	1761	2
2181	2273	2336	2386	2336	573	576	2483	2484	2440	2392	2392	1211	1285	1891	1872	1822	1200	1881	1768	3
2336	2470	2562	2663	2597	598	603	2800	2808	2743	2674	2678	1209	1279	1953	1949	1863	1180	1946	1777	4
2555	2731	2871	3019	2984	626	632	3257	3259	3174	3076	3083	1199	1279	2050	2041	1919	1162	2043	1793	5
2822	3061	3273	3512	3505	658	666	3863	3871	3762	3632	3643	1205	1290	2202	2196	2007	1180	2193	1812	6
3146	3463	3772	4132	4209	693	702	4673	4667	4528	4371	4378	1234	1311	2429	2414	2158	1196	2408	1866	7
3386	3816	4252	4801	5027	731	737	5616	5618	5451	5263	5273	1332	1421	2764	2739	2392	1300	2731	1962	8
3464	3942	4470	5125	5414	746	757	6108	6118	5936	5735	5745	1399	1504	2970	2950	2546	1363	2916	2038	9
3483	3998	4603	5373	5786	765	776	6494	6504	6313	6110	6128	1485	1610	3152	3118	2686	1428	3092	2112	10
3464	4069	4766	5681	6280	780	790	6931	6927	6727	6551	6565	1578	1696	3363	3309	2851	1501	3293	2229	11
1991	2027	2012	2041	1984	540	542	2055	2055	2033	2009	2005	1095	1147	1807	1801	1780	1078	1804	1758	12
2091	2147	2126	2190	2119	556	560	2231	2232	2196	2154	2161	1129	1193	1836	1830	1788	1113	1828	1749	13
2246	2330	2387	2422	2337	578	580	2509	2506	2455	2405	2408	1157	1226	1893	1887	1835	1143	1884	1759	14
2407	2526	2533	2695	2597	602	605	2829	2829	2761	2688	2688	1157	1220	1960	1949	1863	1149	1955	1784	15
2619	2788	2929	3062	2985	627	634	3273	3281	3192	3096	3102	1167	1237	2046	2042	1924	1135	2043	1778	16
2964	3196	3407	3647	3604	653	660	3995	3999	3876	3745	3756	1153	1233	2238	2239	2035	1130	2236	1810	17
3288	3619	3935	4308	4365	686	694	4878	4872	4723	4555	4566	1203	1270	2479	2471	2203	1160	2472	1855	18
3506	3949	4414	4984	5231	716	723	5849	5850	5673	5475	5484	1289	1372	2827	2809	2455	1252	2800	1913	19
3485	3921	4379	4921	5153	724	731	5762	5752	5581	5388	5393	1301	1381	2798	2781	2427	1268	2768	1906	20
3527	4020	4555	5224	5505	744	752	6224	6237	6045	5836	5850	1373	1469	3009	2992	2553	1338	2962	1963	21
3576	4132	4752	5555	5977	762	773	6712	6730	6523	6310	6326	1469	1576	3214	3189	2748	1416	3164	2036	22
3562	4182	4886	5836	6442	783	794	7114	7110	6906	6716	6734	1581	1689	3414	3372	2903	1497	3349	2118	23
1366	1387	1401	1401	1359	502	502	1413	1415	1401	1384	1384	1050	1114	1231	1225	1211	1028	1226	1190	24
1442	1492	1485	1527	1478	515	516	1562	1562	1540	1508	1513	1066	1138	1261	1259	1226	1044	1252	1192	25
1549	1619	1662	1690	1633	540	543	1751	1760	1725	1683	1683	1088	1160	1304	1296	1258	1076	1295	1203	26
1830	1963	1977	2182	2146	590	594	2350	2358	2290	2221	2224	1089	1159	1426	1414	1318	1073	1423	1221	27
1831	1964	2077	2183	2147	594	600	2351	2359	2292	2225	2229	1098	1171	1422	1422	1333	1066	1420	1222	28
2070	2253	2408	2577	2570	625	633	2848	2851	2768	2668	2679	1098	1173	1540	1542	1406	1064	1539	1228	29
2239	2485	2725	3006	3091	662	669	3415	3429	3329	3218	3222	1164	1237	1720	1718	1523	1130	1712	1256	30
2387	2718	3056	3492	3675	699	707	4140	4147	4024	3891	3897	1290	1373	1990	1971	1718	1254	1965	1324	31
2401	2774	3125	3703	3971	716	724	4454	4457	4332	4189	4200	1369	1458	2131	2119	1831	1323	2100	1370	32
2408	2823	3302	3929	4302	738	746	4763	4752	4620	4501	4513	1473	1562	2278	2260	1943	1405	2241	1427	33
2401	2894	3443	4175	4569	769	772	5035	5047	4868	4768	4784	1610	1687	2415	2394	2061	1512	2375	1490	34
1563	1570	1563	1514	1345	511	512	1438	1436	1409	1387	1387	635	653	1233	1225	1218	654	1229	1187	35
1669	1690	1697	1669	1479	531	534	1609	1612	1572	1535	1542	754	782	1264	1260	1232	741	1256	1190	36
1767	1817	1845	1831	1641	552	556	1810	1810	1760	1715	1715	832	870	1307	1296	1251	829	1298	1199	37
1901	1978	2035	2063	1866	579	584	2086	2084	2014	1954	1957	884	936	1363	1359	1279	867	1355	1209	38
2084	2204	2295	2373	2176	612	617	2474	2471	2373	2302	2309	930	988	1449	1443	1336	921	1436	1228	39
2334	2510	2664	2819	2678	636	642	3045	3052	2925	2823	2837	970	1031	1597	1587	1427	955	1582	1247	40
2524	2770	3009	3277	3277	671	679	3682	3685	3566	3429	3436	1072	1143	1806	1798	1575	1043	1786	1304	41
2700	3038	3397	3840	4030	710	718	4507	4502	4368	4213	4220	1235	1313	2140	2115	1832	1197	2113	1445	42
2756	3143	3558	4094	4319	738	746	4880	4882	4738	4579	4586	1348	1446	2327	2305	1977	1308	2286	1540	43
2763	3192	3692	4333	4692	763	773	5251	5255	5101	4938	4949	1465	1582	2508	2481	2136	1400	2456	1648	44
2777	3277	3861	4622	5065	788	795	5619	5607	5431	5315	5329	1604	1707	2701	2664	2291	1514	2646	1759	45
1943	1950	1943	1859	1443	531	533	1654	1655	1589	1549	1549	561	590	1268	1253	1227	594	1252	1171	46
2049	2084	2098	2042	1626	575	578	1877	1873	1804	1746	1750	677	704	(c)	(c)	1260	671	(c)	(c)	47
2285	2288	2330	2309	1887	597	601	2198	2183	2098	2018	2025	752	783	1380	1366	1301	750	1369	1206	48
2443	2570	2654	2697	2295	614	619	2675	2668	2563	2457	2464	802	786	1491	1486	1359	799	1480	1235	49
2682	2858	3020	3133	2795	648	656	3271	3267	3128	2999	3006	868	907	1656	1648	1467	866	1637	1261	50
2908	3154	3401	3647	3478	686	691	4000	3999	3851	3693	3710	992	1044	1912	1902	1646	968	1891	1342	51
3126	3485	3865	4295	4414	728	735	4960	4956	4799	4618	4630	1210	1274	2337	2309	1983	1162	2294	1543	52
3189	3612	4076	4618	4844	752	759	5461	5456	5291	5108	5115	1340	1412	2578	2562	2190	1295	2540	1690	53
3246	3724	4281	4907	5231	782	790	5893	5907	5727	5531	5545	1454	1543	2811	2781	2380	1410	2754	1830	54
3056	3591	4217	4485	5442	808	819	6092	6097	5918	5728	5741	1593	1710	(c)	(c)	2352	1511	(c)	(c)	55
3260	3781	4393	5146	5562	813	824	6230	6238	6058	5865	5883	1595	1729	(c)	(c)	2535	1526	(c)	(c)	56

NACA

TABLE II - AVERAGE PRESSURES AND TEMPERATURES THROUGHOUT MODIFIED X24C-4B
(Stations identified

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Run	Altitude (ft)	Ram-pressure ratio P_2/p_0	Flight Mach number M_0	Tunnel static pressure p_0 (lb/sq ft abs.)	Tunnel temperature T_0 (°R)	Engine speed, N, rpm	Net thrust, F_n (lb)	Indicated temperature $T_{1,1}$ (°R)	Total pressure, P_1 (lb/sq ft abs.)	Static pressure, p_1 (lb/sq ft abs.)	Indicated temperature $T_{1,2}$ (°R)	Total pressure, P_2 (lb/sq ft abs.)	Total pressure, P_2 (lb/sq ft abs.)[a]	Static pressure, p_2 (lb/sq ft abs.)	Compressor stator-stage static pressure, p_3 (lb/sq ft abs.)					
															1	2	3	4	5	6
57	25,000	1.042	.24	778	483	4,000	16	450	812	807	448	811	810	808	813	827	841	855	862	864
58	25,000	1.041	.24	778	487	5,000	45	450	810	802	449	810	809	804	813	834	855	883	898	926
59	25,000	1.041	.24	778	491	6,000	89	449	812	799	447	810	809	801	813	848	884	919	947	982
60	25,000	1.042	.24	778	494	7,000	144	449	812	793	447	811	810	797	820	870	913	961	1010	1060
61	25,000	1.046	.26	778	462	8,000	230	447	815	787	446	814	812	793	827	884	947	1003	1074	1144
62	25,000	1.044	.25	778	464	9,000	393	445	814	771	445	812	812	779	785	862	975	1067	1165	1285
63	25,000	1.049	.26	777	466	10,000	608	443	819	754	442	816	816	768	(c)	(c)	(c)	(c)	(c)	(c)
64	25,000	1.051	.27	781	475	11,000	879	443	820	735	442	817	818	754	(c)	(c)	(c)	(c)	(c)	(c)
65	25,000	1.051	.27	784	483	11,500	1036	444	825	731	442	821	823	752	(c)	(c)	(c)	(c)	(c)	(c)
66	25,000	1.047	.26	781	492	12,000	1191	445	826	725	442	821	823	748	636	692	819	974	1185	1382
67	25,000	1.049	.26	778	506	12,260	1257	446	824	723	442	819	821	745	612	668	788	950	1168	1366
68	25,000	1.206	.53	778	461	4,000	-52	452	938	931	452	938	932	933	933	954	968	982	1003	1017
69	25,000	1.207	.53	778	463	5,000	-28	451	939	929	452	939	932	931	940	975	1003	1024	1045	1067
70	25,000	1.202	.52	781	451	6,000	-5	464	940	924	465	935	940	929	943	985	1027	1056	1091	1133
71	25,000	1.209	.53	781	467	7,000	50	454	945	922	454	944	937	927	936	999	1056	1098	1161	1225
72	25,000	1.207	.53	781	453	8,000	132	464	943	911	465	943	942	928	950	1027	1091	1154	1239	1330
73	25,000	1.210	.53	781	454	9,000	263	464	946	897	465	945	946	909	964	1034	1126	1277	1330	1457
74	25,000	1.211	.53	781	458	10,000	477	465	949	878	466	946	948	895	922	1007	1133	1252	1393	1541
75	25,000	1.210	.53	781	458	11,000	778	465	949	855	465	945	947	877	851	929	1077	1239	1422	1606
76	25,000	1.220	.54	774	460	11,500	954	465	948	843	465	944	945	868	809	880	1027	1196	1406	1605
77	25,000	1.207	.53	774	460	12,000	1109	464	939	828	465	934	935	855	753	816	957	1133	1358	1570
78	25,000	1.209	.53	781	466	12,500	1298	465	948	831	465	944	945	858	711	774	908	1098	1537	1577
79	25,000	1.202	.52	796	506	12,500	1195	492	962	845	491	957	957	873	754	817	965	1141	1380	1599
80	25,000	1.420	.73	776	463	5,000	-129	469	1106	1093	469	1105	1090	1095	1102	1144	1165	1193	1229	1257
81	25,000	1.408	.72	781	453	6,000	-113	473	1100	1082	473	1100	1095	1086	1112	1161	1203	1239	1298	1337
82	25,000	1.416	.72	781	437	7,000	-51	470	1108	1080	471	1106	1092	1087	1105	1175	1239	1295	1365	1435
83	25,000	1.411	.72	781	458	8,000	39	473	1104	1064	473	1102	1098	1074	1119	1203	1274	1351	1457	1555
84	25,000	1.424	.73	781	459	9,000	176	472	1112	1054	473	1112	1108	1068	1126	1210	1323	1422	1552	1696
85	25,000	1.431	.74	788	457	10,000	434	471	1131	1048	471	1126	1126	1068	1098	1196	1344	1485	1654	1823
86	25,000	1.418	.73	788	462	11,000	804	474	1121	1012	475	1117	1115	1039	1020	1112	1289	1464	1682	1893
87	25,000	1.428	.73	774	461	11,500	1006	472	1106	986	474	1105	1099	1015	943	1027	1203	1394	1640	1808
88	25,000	1.415	.72	788	464	12,000	1223	472	1120	989	473	1115	1113	1021	908	985	1154	1359	1619	1865
89	25,000	1.426	.73	788	469	12,500	1417	472	1130	990	473	1124	1122	1024	865	943	1105	1316	1598	1858
90	25,000	1.622	.86	781	459	6,000	-210	497	1268	1246	497	1267	1256	1251	1274	1330	1372	1415	1471	1527
91	25,000	1.630	.87	781	462	7,000	-164	491	1273	1241	492	1273	1261	1250	1291	1358	1422	1435	1502	1640
92	25,000	1.627	.86	781	463	8,000	-69	491	1272	1227	492	1271	1259	1239	1280	1372	1457	1541	1661	1760
93	25,000	1.635	.87	781	462	9,000	106	491	1279	1214	492	1277	1265	1230	1288	1379	1499	1612	1700	1907
94	25,000	1.624	.86	781	472	10,000	431	485	1272	1192	485	1268	1261	1202	1239	1344	1506	1661	1844	2027
95	25,000	1.628	.86	788	474	11,000	856	486	1288	1155	486	1283	1277	1195	1175	1291	1478	1682	1928	2161
96	25,000	1.629	.86	781	481	11,500	1084	487	1278	1142	488	1272	1266	1175	1112	1217	1415	1633	1907	2154
97	25,000	1.632	.87	788	488	12,000	1295	488	1292	1143	489	1286	1281	1179	1070	1168	1365	1591	1957	2101
98	25,000	1.629	.86	788	495	12,500	1535	489	1290	1132	490	1284	1279	1171	1006	1098	1268	1527	1837	2133
99	25,000	2.065	1.07	781	473	8,000	-244	510	1617	1562	511	1613	1590	1573	1633	1738	1837	1943	2076	2203
100	25,000	2.070	1.08	774	475	9,000	-10	510	1607	1531	511	1602	1578	1545	1619	1731	1879	2013	2189	2365
101	25,000	2.052	1.07	781	476	10,000	379	510	1608	1502	511	1603	1581	1525	1584	1710	1907	2083	2302	2527
102	25,000	2.055	1.07	781	483	11,000	944	510	1611	1470	510	1605	1586	1502	1499	1640	1972	2105	2386	2638
103	25,000	2.064	1.07	781	484	11,500	1248	510	1619	1459	511	1612	1593	1496	1450	1584	1830	2090	2414	2717
104	25,000	2.012	1.05	781	494	12,000	1479	511	1579	1406	511	1571	1561	1445	1344	1464	1710	1978	[illegible]	2584
105	25,000	2.035	1.06	781	496	12,500	1734	513	1584	1396	513	1575	1570	1440	1274	1386	1625	1900	1999	2615

[a]Manufacturer's instrumentation.

[b]Data not obtained for turbine stator-stage static pressures.

[c]Data not obtained.

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TURBOJET ENGINE WITH 170.6-SQUARE-INCH EXHAUST NOZZLE - Continued
in figure 3.)

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Compressor stator-stage static pressure, p_3 (lb/sq ft abs.)					Indicated temperature $T_{1,4}$ (°R)	Indicated temperature $T_{1,4}$ (°R)[a]	Total pressure, P_4 (lb/sq ft abs.)	Total pressure, P_4 (lb/sq ft abs.)[a]	Static pressure, p_4 (lb/sq ft abs.)	Total pressure, P_5 (lb/sq ft abs.)[b]	Total pressure, P_5 (lb/sq ft abs.)[a]	Indicated temperature $T_{1,7}$ (°R)	Indicated temperature $T_{1,7}$ (°R)[a]	Total pressure, P_7 (lb/sq ft abs.)	Total pressure, P_7 (lb/sq ft abs.)[a]	Static pressure, p_7 (lb/sq ft abs.)	Indicated temperature $T_{1,8}$ (°R)	Total pressure, P_8 (lb/sq ft abs.)	Static pressure, p_8 (lb/sq ft abs.)	
7	8	9	10	11																Run
898	919	912	926	905	478	478	941	940	930	919	919	1090	1200	808	806	794	1066	808	778	57
947	982	975	1010	975	495	496	1033	1038	1019	1000	996	1091	1153	827	827	804	1066	823	785	58
1017	1074	1067	1123	1088	517	519	1171	1172	1149	1123	1123	1060	1161	854	855	818	1052	849	787	59
1116	1186	1193	1285	1250	540	544	1361	1362	1331	1292	1292	1062	1121	889	884	846	1037	884	794	60
1222	1313	1341	1468	1461	566	572	1593	1587	1552	1503	1507	1069	1130	946	940	877	1042	945	807	61
1398	1531	1581	1785	1806	597	603	1989	1995	1938	1869	1873	1073	1136	1051	1046	952	1047	1046	827	62
(c)	(c)	(c)	(c)	(c)	631	637	(c)	(c)	(c)	(c)	(c)	1153	1215	1188	1186	(c)	1112	1177	860	63
(c)	(c)	(c)	(c)	(c)	667	672	(c)	(c)	(c)	(c)	(c)	1304	1375	1392	1375	(c)	1259	1363	935	64
(c)	(c)	(c)	(c)	(c)	686	693	(c)	(c)	(c)	(c)	(c)	1409	1478	1507	1492	(c)	1342	1476	998	65
1615	1960	2199	2804	3065	712	714	3364	3354	3242	3185	3189	1548	1602	1612	1601	1377	1462	1583	1058	66
1640	2013	2245	2907	3161	726	727	3468	3442	3325	3280	3287	1641	1685	1659	1654	1420	1542	1632	1089	67
1024	1038	1003	1003	891	471	471	961	961	941	926	926	633	658	815	806	792	677	808	778	68
1095	1123	1095	1109	996	488	487	1080	1081	1056	1028	1031	725	751	833	827	813	719	831	785	69
1168	1210	1232	1232	1112	523	525	1222	1225	1191	1154	1161	819	863	857	858	828	819	860	784	70
1281	1344	1337	1415	1288	536	539	1449	1450	1403	1355	1358	843	890	912	906	851	839	910	797	71
1415	1506	1577	1633	1520	578	583	1725	1724	1666	1605	1612	894	951	973	964	894	890	968	803	72
1569	1703	1816	1936	1865	611	618	2114	2119	2042	1968	1971	959	1020	1083	1084	969	929	1071	815	73
1696	1878	2062	2266	2316	649	655	2580	2583	2503	2407	2414	1074	1141	1242	1246	1082	1039	1230	851	74
1802	2055	2316	2654	2794	688	694	3146	3153	3058	2935	2960	1245	1317	1475	1471	1265	1195	1454	935	75
1816	2105	2414	2830	3034	708	714	3411	3414	3315	3207	3217	1354	1438	1610	1605	1372	1298	1576	995	76
1809	2140	2506	2992	3252	732	737	3613	3604	3484	3418	3425	1475	1546	1715	1703	1464	1401	1691	1051	77
1851	2259	2675	3280	3569	759	761	3913	3893	3752	3703	3710	1641	1699	1858	1851	1591	1540	1834	113[illegible]	78
1852	2218	2619	3154	3429	782	787	3786	3795	3668	3595	3598	1611	1678	1804	1803	1542	1528	1773	1099	79
1278	1292	1236	1236	975	494	496	1111	1109	1071	1038	1038	555	550	838	827	813	568	827	775	80
1372	1408	1422	1393	1126	524	525	1293	1295	1249	1203	1210	648	660	871	865	837	646	868	784	81
1492	1555	1527	1598	1337	546	547	1544	1541	1485	1426	1429	707	744	931	929	860	697	921	797	82
1647	1738	1809	1851	1619	578	585	1882	1879	1804	1731	1735	760	833	1007	1006	920	786	1002	803	83
1823	1963	2076	2189	2005	612	619	2330	2330	2237	2147	2158	853	901	1136	1133	1013	843	1130	826	84
1999	2196	2386	2611	2595	649	656	2935	2935	2834	2724	2731	995	1052	1367	1372	1180	956	1354	896	85
2112	2386	2682	3041	3203	695	701	3598	3597	3487	3369	3372	1215	1291	1664	1668	1434	1168	1650	1027	86
2105	2414	2773	3231	3463	712	719	3884	3893	3776	3650	3664	1332	1410	1624	1616	1555	1283	1797	1109	87
2133	2506	2921	3477	3801	733	741	4203	4195	4085	3974	3984	1452	1531	1994	1985	1701	1380	1962	1207	88
2161	2597	3097	3759	4111	759	764	4524	4533	4373	4277	4287	1604	1676	2153	2140	1830	1491	2119	1308	89
1562	1591	1591	1534	1119	538	541	1341	1344	1279	1229	1229	547	562	884	873	842	521	877	784	90
1703	1760	1788	1774	1351	560	565	1625	1626	1549	1482	1489	625	654	942	936	870	626	932	797	91
1865	1957	2020	2055	1682	592	597	1990	1992	1899	1813	1823	704	743	1037	1027	934	700	1025	820	92
2048	2189	2309	2414	2119	628	634	2505	2499	2390	2288	2295	798	839	1205	1196	1044	792	1191	869	93
2217	2421	2625	2851	2773	659	668	3171	3182	2299	2928	2942	959	1014	1455	1457	1253	927	1447	925	94
2407	2703	3027	3428	3590	704	711	4021	4019	3896	3752	3759	1198	1267	1846	1851	1589	1145	1837	1130	95
2429	2773	3153	3646	3865	726	734	4356	4364	4233	4087	4094	1316	1399	2034	2027	1736	1274	2007	1235	96
2464	2865	3315	3914	4252	748	758	4727	4737	4604	4456	4470	1440	1542	2237	2224	1907	1374	2198	1358	97
2456	2928	3463	4167	4561	774	780	5059	5040	4896	4784	4801	1578	1657	2402	2386	2048	1497	2367	1467	98
2316	2407	2478	2471	1802	603	608	2241	2236	2116	2013	2020	587	593	1104	1098	971	592	1092	836	99
2527	2682	2816	2893	2393	640	647	2878	2872	2735	2608	2618	731	757	1323	1316	1138	723	1308	897	100
2745	2970	3196	3407	3175	681	689	3707	3710	3554	3404	3421	929	970	1698	1682	1445	909	1673	1103	101
2949	3287	3646	4062	4188	726	733	4695	4702	4548	4375	4389	1207	1271	2193	2175	1870	1160	2164	1438	102
3048	3442	3886	4414	4639	749	757	5232	5230	5072	4892	4903	1342	1420	2474	2442	2105	1300	2433	1613	103
3006	3456	3970	4604	4935	770	781	5546	5561	5388	5209	5223	1452	1536	2642	2618	2240	1409	2593	1721	104
3006	3520	4125	4885	5371	792	802	5932	5934	5767	5603	5613	1583	1685	2862	2823	2414	1509	2793	1853	105

NACA

TABLE II - AVERAGE PRESSURES AND TEMPERATURES THROUGHOUT MODIFIED X24C-4B
(Stations identified

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Run	Altitude (ft)	Ram-pressure ratio P_2/p_0	Flight Mach number M_0	Tunnel static pressure p_0 (lb/sq ft abs.)	Tunnel temperature T_0 (°R)	Engine speed, N, rpm	Net thrust, F_n (lb)	Indicated temperature $T_{1,1}$ (°R)	Total pressure, P_1 (lb/sq ft abs.)	Static pressure, p_1 (lb/sq ft abs.)	Indicated temperature $T_{1,2}$ (°R)	Total pressure, P_2 (lb/sq ft abs.)	Total pressure, P_2 (lb/sq ft abs.)[a]	Static pressure, p_2 (lb/sq ft abs.)	Compressor stator-stage static pressure, p_3 (lb/sq ft abs.)					
															1	2	3	4	5	6
106	35,000	1.049	.26	493	486	5,000	42	456	517	514	455	517	517	514	514	535	542	563	570	585
107	35,000	1.045	.25	493	488	6,000	62	457	514	508	454	515	515	509	514	528	556	577	592	613
108	35,000	1.043	.24	493	506	7,000	106	458	516	505	456	514	514	507	521	543	577	606	634	662
109	35,000	1.045	.25	493	489	8,000	151	460	517	501	460	515	516	504	521	556	599	634	676	718
110	35,000	1.039	.24	493	489	9,000	256	459	515	491	458	512	513	495	521	563	613	655	718	769
111	35,000	1.049	.26	493	492	10,000	372	459	519	482	458	517	517	489	507	556	620	690	761	852
112	35,000	1.055	.27	493	494	11,000	535	458	524	472	456	520	521	483	472	521	592	583	775	887
113	35,000	1.053	.27	493	498	11,500	627	456	524	465	454	519	521	478	437	486	563	569	782	901
114	35,000	1.057	.28	493	506	12,000	754	455	524	462	453	521	522	475	416	458	542	548	782	915
115	35,000	1.212	.53	500	473	4,000	-24	453	605	601	453	606	604	603	599	620	627	634	648	655
116	35,000	1.201	.52	493	473	5,000	-21	452	593	587	452	592	590	588	599	620	634	641	662	676
117	35,000	1.185	.50	493	476	6,000	1	452	584	575	452	584	582	577	585	606	634	648	669	697
118	35,000	1.203	.53	493	481	7,000	36	453	597	584	453	596	594	586	606	634	669	697	739	775
119	35,000	1.205	.53	493	465	8,000	83	445	596	575	446	594	592	579	599	641	683	725	782	838
120	35,000	1.201	.52	493	468	9,000	198	446	593	562	446	592	590	568	549	648	704	761	838	915
121	35,000	1.2[illegible]9	.53	493	470	10,000	345	447	599	564	447	596	594	563	577	627	711	789	880	979
122	35,000	1.207	.53	493	467	11,000	559	448	598	537	447	595	593	551	521	570	669	775	894	1014
123	35,000	1.207	.53	493	483	11,500	682	450	598	532	449	595	592	546	500	549	641	753	887	1021
124	35,000	1.211	.53	493	489	12,000	801	451	600	529	449	597	597	545	472	521	613	732	880	1028
125	35,000	1.206	.53	500	495	12,159	841	451	606	534	450	603	602	550	472	514	613	732	887	1049
126	35,000	1.404	.72	500	464	5,000	-66	446	702	694	446	702	696	696	704	732	746	768	789	810
127	35,000	1.420	.73	493	468	6,000	-50	445	701	689	446	700	694	691	704	732	761	789	817	852
128	35,000	1.412	.72	493	472	7,000	-20	445	697	680	445	696	689	683	697	739	782	817	859	908
129	35,000	1.420	.73	493	474	8,000	31	445	702	676	445	700	693	680	704	753	803	852	922	993
130	35,000	1.424	.73	493	470	9,000	159	441	704	664	441	702	698	672	704	761	831	901	993	1084
131	35,000	1.429	.73	493	471	10,000	368	441	708	652	441	704	702	664	676	739	831	929	1042	1162
132	35,000	1.430	.73	493	474	11,000	626	441	709	636	441	705	700	651	613	669	782	901	1049	1190
133	35,000	1.422	.73	493	481	11,500	778	441	705	625	441	701	694	643	585	634	746	873	1035	1190
134	35,000	1.422	.73	500	487	12,000	920	443	715	629	443	711	707	649	549	606	711	845	1028	1197
135	35,000	(c)	(c)	500	499	12,295	(c)	446	(c)	(c)	445	(c)	(c)	(c)	528	577	690	817	1007	1197
136	45,000	1.046	.26	303	472	9,000	147	456	318	305	455	317	319	306	317	345	373	409	437	472
137	45,000	1.059	.28	303	441	10,000	261	448	323	310	448	321	321	305	317	352	387	430	479	535
138	45,000	1.059	.28	303	454	11,000	386	453	324	294	453	321	321	298	296	331	380	430	493	563
139	45,000	1.050	.27	303	449	11,220	419	450	320	289	450	318	319	295	289	324	373	430	493	571
140	45,000	1.208	.53	303	482	4,000	-12	453	365	364	453	366	364	364	373	380	380	387	395	402
141	45,000	1.201	.52	303	483	5,000	1	454	364	362	453	364	363	362	373	380	387	402	409	416
142	45,000	1.198	.52	303	485	6,000	1	456	364	358	455	365	362	359	366	387	395	409	423	437
143	45,000	1.201	.52	303	488	7,000	19	460	365	356	460	364	363	356	369	380	402	423	437	458
144	45,000	1.190	.51	310	491	8,000	62	454	371	359	453	369	367	360	366	394	423	451	479	507
145	45,000	1.198	.52	303	492	9,000	119	454	365	346	454	363	360	340	359	395	423	458	493	549
146	45,000	1.246	.58	289	475	10,000	237	453	360	336	450	360	359	342	352	381	430	472	528	585
147	45,000	1.190	.51	310	482	11,000	386	453	371	335	452	369	369	343	331	373	430	493	570	648
148	45,000	1.220	.54	303	488	11,500	464	451	373	332	450	370	369	340	324	359	423	486	571	662
149	45,000	1.382	.70	317	493	4,500	-35	452	436	433	452	439	438	436	(c)	(c)	(c)	(c)	(c)	(c)
150	45,000	1.406	.72	303	500	5,000	-43	455	426	421	453	426	422	422	423	437	451	465	472	466
151	45,000	1.413	.72	303	468	6,000	-14	439	429	422	439	425	426	422	423	444	465	479	493	514
152	45,000	1.465	.76	303	475	7,000	-2	440	445	435	440	444	445	437	444	472	500	521	549	578
153	45,000	1.396	.71	303	484	8,000	49	442	424	410	441	423	422	413	423	409	465	514	556	599
154	45,000	1.397	.71	310	483	9,000	117	441	435	411	441	433	432	416	437	472	514	563	613	669
155	45,000	1.396	.71	303	462	10,000	232	449	424	394	446	423	422	401	416	451	500	563	627	697
156	45,000	1.380	.70	303	494	11,000	383	460	422	382	459	418	415	390	387	423	483	549	627	711
157	45,000	1.409	.72	303	502	11,500	522	455	429	384	454	427	425	394	373	409	479	563	655	761
158	45,000	1.413	.72	303	509	11,666	551	454	431	383	453	428	425	394	366	409	479	563	662	768

[a]Manufacturer's instrumentation.

[b]Data not obtained for turbine stator-stage static pressures.

[c]Data not obtained.

NACA

TURBOJET ENGINE WITH 170.6-SQUARE-INCH EXHAUST NOZZLE - Concluded
in figure 3.)

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Compressor stator-stage static pressure, p_3 (lb/sq ft abs.)					Indicated temperature $T_{1,4}$ (°R)	Indicated temperature $T_{1,4}$ (°R)[a]	Total pressure, P_4 (lb/sq ft abs.)	Total pressure, P_4 (lb/sq ft abs.)[a]	Static pressure, p_4 (lb/sq ft abs.)	Total pressure, P_5 (lb/sq ft abs.)[b]	Total pressure, P_5 (lb/sq ft abs.)[a]	Indicated temperature $T_{1,7}$ (°R)	Indicated temperature $T_{1,7}$ (°R)[a]	Total pressure, P_7 (lb/sq ft abs.)	Total pressure, P_7 (lb/sq ft abs.)[a]	Static pressure, p_7 (lb/sq ft abs.)	Indicated temperature $T_{1,9}$ (°R)	Total pressure, P_8 (lb/sq ft abs.)	Static pressure, p_8 (lb/sq ft abs.)	Run
7	8	9	10	11																
599	627	620	648	620	505	507	659	655	649	638	641	1231	1285	525	528	512	1169	524	499	106
634	669	669	711	690	527	529	734	739	723	708	704	1247	1293	536	535	521	1193	538	499	107
697	746	746	803	789	556	562	851	852	837	814	817	1251	1282	566	563	535	1197	561	503	108
766	831	855	937	929	586	590	1013	1014	988	958	958	1225	1255	600	599	561	1164	598	509	109
852	944	972	1028	1113	616	621	1220	1218	1189	1155	1155	1208	1254	661	662	597	1166	648	525	110
944	1063	1113	1296	1345	650	655	1490	1486	1449	1401	1401	1225	1275	741	739	655	1181	728	539	111
1000	1155	1253	1514	1612	687	693	1799	1802	1752	1701	1701	1384	1430	869	859	748	1310	847	587	112
1021	1204	1324	1640	1760	704	710	1961	1964	1905	1856	1863	1474	1515	942	937	805	1392	917	618	113
1063	1296	1429	1817	1964	733	734	2146	2147	2075	2039	2042	1637	1677	1032	1028	882	1537	1007	674	114
662	669	669	648	577	446	446	619	620	607	599	599	705	736	526	521	519	729	526	500	115
690	711	711	704	634	490	490	688	690	674	659	655	795	840	529	528	521	852	522	493	116
725	753	768	768	704	513	515	774	775	754	732	732	851	907	545	542	521	863	542	496	117
810	852	880	901	824	536	540	917	922	887	859	859	867	920	579	577	544	870	567	502	118
894	951	1007	1042	979	561	565	1102	1105	1067	1035	1035	898	948	624	620	568	890	618	516	119
1000	1091	1239	1253	1232	597	602	1376	1380	1335	1281	1289	986	1027	698	697	622	949	692	532	120
1084	1211	1338	1479	1535	634	640	1698	1697	1649	1591	1591	1095	1147	815	810	704	1058	803	566	121
1148	1317	1507	1739	1852	675	681	2078	2084	2025	1954	1961	1311	1359	989	979	840	1248	964	646	122
1162	1373	1591	1880	2014	700	705	2242	2243	2180	2126	2133	1445	1499	1073	1063	917	1358	1046	695	123
1197	1450	1704	2056	2218	727	728	2435	2436	2355	2313	2316	1592	1641	1167	1162	998	1492	1141	765	124
1225	1500	1760	2126	2288	735	737	2505	2492	2411	2401	2377	1639	1682	1203	1197	1030	1535	1171	779	125
824	838	831	803	648	476	476	730	732	705	687	683	627	561	543	535	528	597	536	504	126
873	901	908	894	732	496	497	836	838	806	775	779	627	652	559	556	530	614	551	496	127
951	993	1021	1021	873	525	527	1002	1000	962	922	926	692	733	595	592	547	689	592	506	128
1056	1120	1159	1204	1063	553	556	1233	1232	1181	1134	1138	754	790	654	648	585	763	646	522	129
1176	1281	(c)	1450	1373	584	589	1573	1570	1518	1457	1465	856	904	764	761	664	847	752	552	130
1281	1422	(c)	1739	1774	623	629	1989	1985	1926	1856	1859	1022	1073	932	929	798	983	911	618	131
1338	1542	(c)	2035	2176	664	669	2436	2436	2370	2285	2295	1262	1310	1158	1148	974	1194	1124	744	132
1359	1591	(c)	2204	2390	689	694	2642	2640	2570	2503	2506	1396	1459	1260	1246	1072	1325	1239	824	133
1401	1690	(c)	2415	2633	714	715	2981	2887	2785	2743	2743	1552	1611	1377	1373	1178	1458	1359	897	134
1422	1746	2028	2513	2704	733	734	2964	2950	2845	2813	2813	1641	1684	(c)	(c)	1209	1537	(c)	(c)	135
514	571	592	669	683	621	626	748	747	731	708	704	1322	1330	411	409	363	1232	402	319	136
599	676	711	838	873	652	659	964	965	941	915	908	1343	1386	483	479	418	1223	470	336	137
634	747	803	986	1042	701	707	1148	1155	1125	1095	1099	1565	1594	571	571	504	1442	550	374	138
648	775	831	1035	1106	713	718	1202	1211	1173	1152	1148	1612	1614	586	585	481	1492	571	381	139
402	415	402	402	366	475	475	387	387	381	377	373	771	823	321	317	324	841	316	310	140
423	444	430	437	402	493	494	432	437	424	413	416	890	938	324	324	324	918	327	310	141
451	479	465	486	444	520	520	494	486	473	462	462	962	996	339	338	331	955	333	309	142
479	514	507	542	507	547	552	554	556	542	525	521	1021	1051	353	352	331	987	347	309	143
579	585	592	641	620	572	577	682	683	665	645	641	1067	1099	391	387	359	1004	382	319	144
592	648	662	747	739	609	615	817	817	795	772	768	1115	1139	428	423	380	1064	419	326	145
655	733	775	901	937	649	653	1035	1035	1007	972	972	1252	1286	499	493	430	1195	492	339	146
725	852	922	1120	1190	691	696	1328	1331	1297	1253	1260	1467	1516	637	627	544	1399	622	406	147
761	908	986	1219	1317	722	724	1435	1436	1388	1366	1370	1660	1687	694	690	599	1563	677	451	148
(c)	(c)	(c)	(c)	(c)	473	473	(c)	(c)	(c)	(c)	(c)	569	600	339	338	(c)	572	333	317	149
493	500	479	479	395	486	486	440	444	424	413	416	627	669	332	331	319	678	325	303	150
535	543	634	549	465	493	493	522	521	505	490	486	652	716	346	338	329	700	338	306	151
606	634	655	655	563	520	521	641	641	617	592	592	709	771	375	375	345	704	370	312	152
634	686	713	732	669	554	559	768	775	740	711	711	838	890	408	402	364	832	400	319	153
725	796	852	908	873	587	592	999	993	958	922	922	922	961	480	479	421	896	473	346	154
[illegible]	866	959	1056	1084	636	641	1203	1204	1167	1124	1127	1116	1148	570	563	486	1072	558	399	155
[illegible]	923	986	1204	1275	694	699	1417	1422	1386	1345	1345	1443	1485	686	683	583	1374	675	448	156
[illegible]	1042	1134	1401	1514	720	723	1660	1676	1616	1574	1577	1603	1657	801	796	685	1517	781	513	157
897	1056	1155	1443	1556	728	730	1697	1704	1644	1612	1619	1671	1711	818	817	706	1577	802	534	158

NACA

TABLE III - LUBRICATION AND FUEL-SYSTEM DATA FOR MODIFIED X24C-4B TURBOJET ENGINE WITH 170.6-SQUARE-INCH EXHAUST NOZZLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
									Oil pressures (lb/sq in. gage)					Oil temperatures, (°F)									Bearing temperatures (°F)		
Run	Altitude (ft)	Ram-pressure ratio, P_2/p_0	Flight Mach number, M_0	Tunnel static pressure p_0 (lb/sq ft abs.)	Tunnel temperature, T_0 (°R)	Engine speed, N (rpm)	Fuel manifold pressure (lb/sq in. gage)[a]	Fuel temperature, °F	Pump inlet	Pump outlet	Cooler inlet	Cooler outlet	Scavenge pump outlet	Pump inlet	Cooler inlet	Cooler outlet	Gear case scavenge	Bearing 2 (fore) scavenge	Bearing 2 (aft) scavenge	Bearing 3 (fore) scavenge	Bearing 3 (aft) scavenge	Scavenge pump outlet	1	2	3
1	5,000	1.009	0.09	1753	466	4,000	5	70	19.8	44	42	31	3.3	68	64	45	40	68	67	76	82	37	61	87	95
2	5,000	1.010	.09	1752	469	5,000	8	68	19.5	53	52	36	3.5	75	66	54	45	75	74	80	87	43	66	86	96
3	5,000	1.011	.10	1752	469	6,000	12	67	19.3	64	62	42	3.3	78	70	60	51	88	83	86	100	50	72	102	103
4	5,000	1.012	.10	1752	469	7,000	17	68	19.1	73	71	49	3.4	80	73	64	55	95	89	92	105	57	77	114	110
5	5,000	1.012	.10	1752	474	8,000	25	68	19.0	71	71	50	3.6	87	80	70	60	112	103	104	118	67	85	126	123
6	5,000	1.014	.11	1752	477	9,000	35	68	19.0	84	80	60	3.7	97	90	78	68	119	109	110	124	72	90	138	126
7	5,000	1.016	.11	1752	478	10,000	53	65	18.8	102	95	70	3.7	93	85	76	68	128	117	117	134	74	98	150	136
8	5,000	1.019	.13	1753	477	11,000	86	66	17.9	137	128	88	4.1	75	70	65	62	122	104	106	125	69	96	128	132
9	5,000	1.022	.16	1753	484	11,500	110	65	17.7	138	129	84	4.5	73	72	65	63	132	111	115	143	75	103	134	141
10	5,000	1.022	.16	1752	486	12,000	136	64	17.8	138	128	85	4.5	76	75	68	65	138	118	120	150	80	102	139	145
11	5,000	1.024	.19	1753	486	12,440	171	63	17.8	139	131	86	4.8	79	79	70	68	142	122	128	161	85	110	142	152
12	5,000	1.041	.24	1752	469	4,000	5	74	19.9	39	36	29	3.3	77	72	57	53	80	80	89	96	50	73	100	108
13	5,000	1.042	.24	1746	471	5,000	8	74	19.8	47	44	34	3.2	84	75	65	60	93	89	96	107	61	77	109	112
14	5,000	1.041	.24	1753	470	6,000	12	74	19.8	50	51	40	3.3	96	88	73	59	91	88	95	101	57	79	111	120
15	5,000	1.041	.24	1752	474	7,000	17	73	19.2	68	64	47	3.3	86	79	72	65	105	99	103	116	72	81	123	120
16	5,000	1.040	.24	1753	473	8,000	24	70	19.2	77	75	54	3.4	86	80	71	63	107	98	103	114	68	83	124	123
17	5,000	1.044	.25	1767	474	9,000	36	70	19.0	94	90	65	3.6	86	80	71	63	113	102	104	120	70	85	131	126
18	5,000	1.046	.26	1767	474	10,000	55	68	18.8	111	105	73	3.8	85	78	71	65	124	111	111	126	72	89	138	142
19	5,000	1.047	.26	1760	477	11,000	88	65	18.6	121	112	78	4.1	84	78	71	67	131	116	116	139	76	98	142	141
20	5,000	1.048	.26	1760	479	11,000	85	64	18.5	123	117	79	4.4	82	77	70	67	131	115	117	140	77	98	140	143
21	5,000	1.048	.26	1760	484	11,500	110	64	18.3	128	120	81	4.4	83	81	72	69	136	120	124	149	84	101	141	147
22	5,000	1.052	.27	1760	489	12,000	140	63	18.2	130	122	82	4.5	84	83	75	72	140	124	129	157	90	104	143	150
23	5,000	1.053	.27	1760	496	12,500	175	63	18.0	130	122	82	4.7	85	85	77	77	149	131	134	170	99	109	148	154
24	15,000	1.039	.24	1190	454	4,000	4	48	19.7	48	47	32	3.5	67	61	44	28	61	58	65	70	31	46	82	89
25	15,000	1.042	.24	1189	458	5,000	5	77	19.3	62	62	38	3.5	64	60	45	41	69	65	69	76	42	47	79	89
26	15,000	1.038	.23	1197	450	6,000	8	69	19.4	67	66	43	3.4	74	66	50	41	83	77	79	93	47	57	92	96
27	15,000	1.043	.24	1189	458	8,000	16	74	18.2	111	111	68	3.7	67	60	53	50	90	80	80	95	55	60	97	108
28	15,000	1.040	.24	1197	456	8,000	16	66	19.0	92	89	62	3.6	76	70	58	50	97	88	89	104	57	65	112	108
29	15,000	1.043	.24	1190	455	9,000	22	66	18.6	104	99	69	3.7	79	73	62	53	105	95	95	113	63	71	129	110
30	15,000	1.046	.26	1190	453	10,000	34	65	18.6	122	116	78	3.8	78	73	63	56	112	100	100	121	67	77	140	(b)
31	15,000	1.048	.26	1190	465	11,000	52	66	18.2	132	124	82	4.1	78	74	65	59	122	106	106	123	72	86	127	(b)

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32	15,000	1.049	0.26	1190	463	11,500	66	65	18.1	135	128	84	4.2	78	74	65	59	125	107	108	130	73	88	122	(b)
33	15,000	1.051	.27	1190	471	12,000	83	65	18.0	136	128	83	4.4	79	78	67	64	130	112	113	137	78	72	88	104
34	15,000	1.053	.27	1190	476	12,500	104	64	18.0	139	130	85	4.7	80	79	69	66	133	117	118	146	85	77	98	110
35	15,000	1.204	.52	1190	464	4,000	2	57	19.8	31	31	28	3.4	112	97	68	50	77	77	84	81	46	83	107	120
36	15,000	1.208	.53	1190	464	5,000	4	75	19.7	39	39	34	3.3	117	104	78	56	87	87	92	93	55	86	110	122
37	15,000	1.208	.53	1190	465	6,000	6	75	19.5	45	45	38	3.4	121	110	85	62	100	99	104	112	65	88	114	130
38	15,000	1.206	.53	1190	466	7,000	9	75	19.3	56	55	43	3.4	116	107	85	65	107	104	109	120	70	80	128	120
39	15,000	1.204	.52	1190	463	8,000	13	74	19.1	69	67	50	3.5	109	100	82	64	114	108	111	130	65	80	134	132
40	15,000	1.209	.53	1186	468	9,000	20	70	18.5	108	100	70	3.7	77	70	63	55	106	96	96	114	62	88	130	126
41	15,000	1.207	.53	1186	469	10,000	31	69	18.3	121	114	76	3.9	76	70	63	56	115	102	102	123	67	98	132	138
42	15,000	1.212	.53	1186	472	11,000	55	68	17.9	137	128	85	4.2	75	70	64	59	118	105	105	125	70	103	138	140
43	15,000	1.213	.53	1186	472	11,500	73	66	17.8	136	127	84	4.4	78	73	66	62	125	111	111	135	70	113	148	153
44	15,000	1.209	.53	1186	473	12,000	94	64	17.9	133	125	83	4.5	84	78	72	66	131	119	119	145	77	103	138	(b)
45	15,000	1.212	.53	1186	472	12,500	124	63	18.0	130	121	83	4.8	93	88	80	72	140	130	130	158	88	113	148	153
46	15,000	1.436	.74	1183	476	5,000	3	81	19.8	43	42	34	3.2	88	80	70	65	100	95	101	114	70	91	115	115
47	15,000	(b)	(b)	1197	501	6,000	5	81	19.4	46	43	34	3.3	90	85	81	80	119	115	120	135	76	106	124	128
48	15,000	1.429	.73	1190	480	7,000	8	77	19.2	57	53	40	3.1	90	85	80	78	124	116	120	137	83	111	125	128
49	15,000	1.426	.73	1190	479	8,000	13	75	19.0	77	73	54	3.4	87	81	76	70	114	105	106	120	76	93	126	128
50	15,000	1.425	.73	1190	479	9,000	19	72	18.9	93	89	68	3.7	87	82	77	70	115	107	108	121	77	95	136	132
51	15,000	1.423	.73	1190	482	10,000	31	70	18.7	110	102	75	3.9	87	82	77	72	125	115	115	129	80	100	146	142
52	15,000	1.418	.73	1190	486	11,000	60	66	18.3	119	111	79	4.1	87	79	78	74	127	116	117	135	79	100	137	139
53	15,000	1.413	.72	1190	495	11,500	84	65	18.2	122	114	80	4.5	87	84	79	77	140	122	124	147	85	112	140	145
54	15,000	1.419	.73	1190	503	12,000	111	64	18.0	123	116	81	4.9	88	89	83	82	149	130	132	158	100	119	143	150
55	15,000	(b)	(b)	1190	515	12,500	144	62	18.0	123	117	80	4.8	90	90	87	87	158	137	140	141	112	133	154	158
56	15,000	(b)	(b)	1190	519	12,500	140	64	18.1	121	113	80	4.8	91	91	89	89	157	137	141	173	114	132	151	161
57	25,000	1.042	.24	778	483	4,000	2	65	19.7	42	40	31	3.5	72	68	51	48	65	65	71	75	46	36	74	92
58	25,000	1.041	.24	778	487	5,000	3	88	19.5	51	50	36	3.4	76	70	59	54	78	77	78	88	57	44	85	100
59	25,000	1.041	.24	778	491	6,000	5	85	19.2	64	61	43	3.5	78	72	62	58	87	82	83	98	62	50	95	104
60	25,000	1.042	.24	778	494	7,000	7	83	19.0	78	75	53	3.7	77	72	63	60	93	88	88	102	62	53	92	106
61	25,000	1.046	.26	778	462	8,000	10	60	18.0	119	109	71	3.9	62	57	48	47	81	72	73	88	51	51	100	102
62	25,000	1.044	.25	778	464	9,000	14	60	17.6	136	125	78	3.9	62	57	49	49	90	79	79	96	57	55	120	104
63	25,000	1.049	.26	777	466	10,000	20	71	17.5	148	135	86	4.0	63	57	50	50	99	84	84	103	57	61	129	110
64	25,000	1.051	.27	781	475	11,000	32	69	17.3	155	141	89	4.1	64	63	53	53	107	91	91	110	66	71	120	120
65	25,000	1.051	.27	784	483	11,500	40	70	17.2	150	137	87	4.3	67	67	57	57	111	100	100	122	70	77	114	129
66	25,000	1.047	.26	781	492	12,000	52	68	17.2	151	138	87	4.4	68	69	60	60	112	104	104	128	76	79	116	135
67	25,000	1.049	.26	778	506	12,260	58	67	17.2	149	136	88	4.5	70	71	64	64	115	108	108	135	83	81	119	136
68	25,000	1.206	.53	778	461	4,000	2	54	19.5	53	51	33	3.7	63	57	39	33	56	53	55	56	32	38	74	78
69	25,000	1.207	.53	778	463	5,000	3	80	19.2	63	60	39	3.6	65	62	42	40	67	63	65	73	41	46	83	88
70	25,000	1.202	.52	781	451	6,000	5	75	18.9	81	78	49	3.8	61	56	43	38	67	63	64	74	40	52	75	84
71	25,000	1.209	.53	781	467	7,000	7	78	18.8	90	84	56	3.7	69	63	51	46	83	77	77	92	51	55	98	99
72	25,000	1.207	.53	781	453	8,000	11	73	18.0	120	112	73	3.9	63	57	48	44	79	71	71	84	47	56	88	98
73	25,000	1.210	.53	781	454	9,000	14	73	17.8	138	129	83	3.9	62	57	48	46	87	77	77	91	52	60	90	101
74	25,000	1.211	.53	781	456	10,000	21	70	17.3	145	136	86	4.0	62	61	50	50	104	89	87	104	62	63	130	118
75	25,000	1.210	.53	781	458	11,000	34	67	17.3	152	140	88	4.2	63	63	52	52	109	90	90	107	67	71	126	115
76	25,000	1.220	.54	774	460	11,500	43	65	17.2	149	138	86	4.2	65	65	55	55	116	97	96	114	70	78	127	117
77	25,000	1.207	.53	774	460	12,000	55	66	17.2	150	138	86	4.4	67	66	56	56	121	100	100	120	73	80	128	120
78	25,000	1.209	.53	781	466	12,500	72	66	17.1	162	141	87	4.6	68	68	59	59	119	104	104	135	76	84	124	129
79	25,000	1.202	.52	796	506	12,500	64	67	17.4	132	122	80	4.8	79	81	75	75	141	119	122	154	85	101	138	148

[a]Data not obtained for pump-inlet and pump-outlet pressures because engine governor was not installed.
[b]Data not obtained.

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TABLE III - LUBRICATION AND FUEL-SYSTEM DATA FOR MODIFIED X24C-4B TURBOJET ENGINE WITH 170.6-SQUARE-INCH EXHAUST NOZZLE - Concluded.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
									Oil pressures (lb/sq in. gage)					Oil temperatures, (°F)									Bearing temperatures (°F)		
Run	Altitude (ft)	Ram-pressure ratio, P_2/p_0	Flight Mach number, M_0	Tunnel static pressure p_0 (lb/sq ft abs.)	Tunnel temperature, T_0 (°R)	Engine speed, N (rpm)	Fuel manifold pressure, (lb/sq in. gage)a	Fuel temperature, °F	Pump inlet	Pump outlet	Cooler inlet	Cooler outlet	Scavenge pump outlet	Pump inlet	Cooler inlet	Cooler outlet	Gear case scavenge	Bearing 2 (fore) scavenge	Bearing 2 (aft) scavenge	Bearing 3 (fore) scavenge	Bearing 3 (aft) scavenge	Scavenge pump outlet	1	2	3
80	25,000	1.420	0.73	778	463	5,000	3	58	19.5	58	54	38	3.6	73	67	50	45	71	68	71	44	45	58	80	92
81	25,000	1.408	.72	781	453	6,000	6	57	19.2	66	63	43	3.6	74	67	54	50	90	83	83	99	57	65	95	97
82	25,000	1.416	.72	781	467	7,000	7	81	19.0	81	78	54	3.7	78	71	60	54	90	84	84	96	59	78	96	104
83	25,000	1.411	.72	781	458	8,000	10	70	18.7	87	83	54	3.7	74	70	58	55	106	98	98	118	70	74	109	113
84	25,000	1.424	.73	781	459	9,000	15	70	18.1	126	118	77	4.0	67	61	53	50	95	85	85	99	59	69	116	105
85	25,000	1.431	.74	788	457	10,000	24	68	17.8	140	132	87	4.0	67	58	55	52	106	91	91	109	58	70	110	118
86	25,000	1.418	.73	788	462	11,000	40	66	17.8	147	137	89	4.2	69	67	58	56	112	98	95	113	68	77	115	119
87	25,000	1.428	.73	774	461	11,500	52	65	17.8	147	136	88	4.3	69	69	58	57	116	102	101	122	72	83	120	127
88	25,000	1.415	.72	788	464	12,000	67	65	17.8	148	137	87	4.5	71	70	60	59	124	107	103	124	74	86	127	124
89	25,000	1.426	.73	788	469	12,500	89	65	17.7	148	138	88	4.6	73	73	63	63	126	114	110	135	78	88	131	131
90	25,000	1.622	.86	781	459	6,000	5	57	19.6	50	50	40	3.5	103	95	77	63	94	91	94	100	67	84	98	110
91	25,000	1.630	.87	781	462	7,000	7	57	19.4	60	59	47	3.5	107	100	82	67	102	98	101	110	72	90	104	116
92	25,000	1.627	.86	781	463	8,000	10	58	19.2	67	66	52	3.6	113	105	88	73	113	107	110	120	77	94	115	128
93	25,000	1.635	.87	781	462	9,000	15	59	19.2	81	80	67	3.8	117	110	93	74	119	114	115	123	79	96	133	136
94	25,000	1.624	.86	781	472	10,000	25	71	17.9	125	118	79	4.0	74	74	64	62	116	103	103	122	74	83	139	132
95	25,000	1.628	.86	788	474	11,000	46	68	17.8	135	126	85	4.2	76	75	66	64	120	104	104	119	75	84	133	124
96	25,000	1.629	.86	781	481	11,500	62	68	17.7	136	127	85	4.7	76	75	67	65	128	108	108	126	78	90	133	127
97	25,000	1.632	.87	788	488	12,000	80	66	17.7	138	128	85	4.8	77	78	68	67	135	113	113	133	80	93	136	130
98	25,000	1.629	.86	788	495	12,500	103	65	17.4	140	131	86	4.9	77	77	71	70	141	118	121	150	39	98	139	147
99	25,000	2.065	1.07	781	473	8,000	10	78	19.1	76	74	59	3.6	93	87	79	72	110	105	105	116	76	102	124	120
100	25,000	2.070	1.08	774	475	9,000	16	76	19.0	86	82	65	3.8	96	90	82	75	120	112	112	122	82	101	138	130
101	25,000	2.052	1.07	781	476	10,000	28	74	18.8	109	103	78	3.9	93	87	80	75	125	115	115	127	83	104	128	144
102	25,000	2.055	1.07	781	483	11,000	57	68	18.5	113	108	78	4.2	92	87	80	76	134	118	117	131	87	101	141	134
103	25,000	2.064	1.07	781	484	11,500	81	65	18.3	119	111	79	4.5	91	90	81	77	142	122	123	146	91	109	141	144
104	25,000	2.012	1.05	781	494	12,000	103	65	18.2	119	111	79	4.9	93	92	84	82	151	129	130	157	102	117	146	149
105	25,000	2.035	1.06	781	498	12,500	134	63	18.2	122	117	80	5.0	94	93	86	84	156	132	136	168	106	123	150	157
106	35,000	1.049	.26	493	486	5,000	2	62	19.5	47	45	35	3.7	78	73	65	61	84	81	87	99	67	50	90	105
107	35,000	1.045	.25	493	488	6,000	2	63	19.4	59	56	41	3.6	80	75	68	63	89	86	88	102	70	52	90	107
108	35,000	1.043	.24	493	506	7,000	4	64	17.9	66	61	42	3.8	78	79	70	70	112	104	104	115	82	69	101	111
109	35,000	1.045	.25	493	489	8,000	6	60	18.6	92	85	62	3.8	75	71	66	65	102	95	95	103	70	64	99	110
110	35,000	1.039	.24	493	489	9,000	8	62	18.2	109	100	71	3.8	75	75	68	67	105	97	95	105	75	66	110	110

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111	35,000	1.049	0.26	493	492	10,000	11	61	18.0	121	111	78	4.0	76	75	69	69	113	102	98	114	78	72	124	119
112	35,000	1.055	.27	493	494	11,000	16	67	17.8	133	123	86	3.9	76	76	70	69	115	104	102	116	80	79	116	123
113	35,000	1.053	.27	493	498	11,500	20	74	17.8	136	125	87	4.1	76	78	71	70	114	105	105	122	83	84	108	127
114	35,000	1.057	.28	493	506	12,000	26	72	17.5	138	126	85	4.5	78	78	72	72	124	112	110	129	90	90	114	131
115	35,000	1.212	.53	500	473	4,000	1	54	19.8	41	40	31	3.8	72	68	48	45	72	71	75	83	49	47	88	97
116	35,000	1.201	.52	493	473	5,000	2	57	19.4	51	50	36	3.8	76	70	55	50	79	76	80	92	53	51	96	101
117	35,000	1.185	.50	493	476	6,000	3	59	19.1	62	60	42	3.8	77	70	58	50	85	80	83	98	58	54	104	103
118	35,000	1.209	.53	493	481	7,000	4	83	19.0	74	70	49	3.8	77	71	61	56	93	88	89	105	63	60	95	106
119	35,000	1.205	.53	493	465	8,000	6	77	18.5	103	97	68	4.0	73	67	57	51	83	78	78	91	55	55	95	99
120	35,000	1.201	.52	493	468	9,000	8	77	18.0	122	114	77	4.0	70	65	57	54	93	85	85	95	63	58	105	106
121	35,000	1.209	.53	493	470	10,000	13	75	17.8	135	125	84	4.1	70	68	60	59	101	90	90	105	68	65	132	112
122	35,000	1.207	.53	493	467	11,000	20	73	17.5	143	132	88	4.2	72	70	63	62	106	94	94	109	73	75	130	118
123	35,000	1.207	.53	493	483	11,500	25	70	17.5	142	131	88	4.3	74	72	65	65	115	100	100	115	73	82	130	124
124	35,000	1.211	.53	493	489	12,000	31	69	17.5	142	131	88	4.5	76	76	67	67	122	106	106	125	81	85	134	132
125	35,000	1.206	.53	500	495	12,159	35	68	17.5	139	129	85	4.6	76	76	68	68	123	109	109	130	83	88	135	136
126	35,000	1.404	.72	500	464	5,000	3	55	19.5	52	53	38	3.8	75	68	50	45	69	66	68	73	45	47	82	87
127	35,000	1.420	.73	493	468	6,000	3	55	19.1	68	64	44	3.8	76	70	55	48	78	74	75	85	52	53	102	93
128	35,000	1.412	.72	493	472	7,000	4	56	19.0	78	76	53	3.8	77	71	58	52	86	81	82	95	59	58	96	98
129	35,000	1.420	.73	493	474	8,000	6	56	18.8	92	88	63	3.8	78	73	61	55	92	86	86	100	63	61	108	104
130	35,000	1.424	.73	493	470	9,000	10	75	18.2	118	109	75	3.8	73	68	59	56	93	85	85	97	63	61	113	111
131	35,000	1.428	.73	493	471	10,000	15	75	17.9	134	126	87	4.0	74	68	60	58	101	90	90	102	62	64	132	114
132	35,000	1.430	.73	493	474	11,000	25	72	17.8	143	133	90	4.2	74	67	61	60	106	93	92	96	65	70	132	107
133	35,000	1.422	.73	493	481	11,500	32	70	17.6	142	132	88	4.4	74	68	63	62	116	99	95	100	66	77	132	107
134	35,000	1.422	.73	500	487	12,000	42	67	17.5	143	133	89	4.8	75	74	64	63	121	103	103	121	74	79	132	128
135	35,000	(b)	(b)	500	499	12,295	46	68	17.7	143	132	90	4.8	78	78	68	68	125	109	109	130	84	82	136	135
136	45,000	1.046	.26	303	472	9,000	6	62	18.1	103	95	68	4.0	76	75	69	67	109	98	97	105	77	68	102	108
137	45,000	1.059	.28	303	441	10,000	8	81	18.1	106	98	69	4.0	81	81	72	70	119	107	106	128	82	78	111	128
138	45,000	1.059	.28	303	454	11,000	11	78	17.8	124	113	78	4.1	78	77	71	71	117	106	104	123	81	85	109	124
139	45,000	1.050	.27	303	449	11,220	12	77	17.9	111	111	75	4.1	80	79	72	72	120	110	106	128	82	87	111	127
140	45,000	1.208	.53	303	482	4,000	1	57	19.7	39	36	30	3.7	77	73	62	57	79	78	81	88	62	51	85	96
141	45,000	1.201	.52	303	483	5,000	1	58	19.5	48	45	35	3.8	80	74	66	62	85	84	85	95	68	57	88	100
142	45,000	1.198	.52	303	485	6,000	2	60	19.1	59	56	41	3.8	81	76	68	65	93	90	90	101	73	62	94	103
143	45,000	1.201	.52	303	488	7,000	3	60	19.0	69	66	48	3.9	80	77	70	68	102	96	96	103	77	65	98	104
144	45,000	1.190	.51	310	491	8,000	4	60	18.8	79	76	56	3.9	82	80	74	72	109	101	101	113	80	68	108	111
145	45,000	1.198	.52	303	492	9,000	6	60	18.4	91	83	62	4.0	82	81	75	75	117	108	105	117	85	75	113	115
146	45,000	1.246	.58	289	475	10,000	8	62	18.0	118	108	75	4.0	78	76	71	70	115	103	100	116	79	72	122	118
147	45,000	1.190	.51	310	482	11,000	12	62	17.8	126	116	80	4.1	80	78	72	72	118	106	99	111	82	80	124	110
148	45,000	1.220	.54	303	488	11,500	15	63	17.8	128	119	81	4.2	80	80	74	74	117	110	107	125	88	88	110	126
149	45,000	1.382	.70	317	493	4,500	1	61	19.5	42	40	32	3.6	78	75	64	62	85	84	87	97	65	53	94	104
150	45,000	1.406	.72	303	500	5,000	1	63	19.4	46	43	34	3.6	78	75	67	66	94	92	93	105	73	58	93	106
151	45,000	1.413	.72	303	468	6,000	2	57	19.2	64	61	43	3.9	77	71	59	52	80	79	79	88	58	54	92	105
152	45,000	1.465	.76	303	475	7,000	3	58	19.0	76	72	52	3.9	78	74	64	60	90	86	86	99	68	60	100	105
153	45,000	1.396	.71	303	484	8,000	4	60	18.9	89	82	61	3.9	78	75	67	64	95	90	90	100	69	61	105	108
154	45,000	1.397	.71	310	483	9,000	6	61	18.5	107	99	71	4.0	78	75	68	65	102	95	95	102	75	64	114	112
155	45,000	1.396	.71	303	482	10,000	9	80	18.1	118	110	78	4.0	78	77	70	70	114	103	99	115	77	72	109	117
156	45,000	1.380	.70	303	494	11,000	13	80	17.6	136	124	88	4.2	75	75	69	69	115	103	100	116	82	83	111	121
157	45,000	1.409	.72	303	502	11,500	18	76	17.6	134	123	84	4.3	77	78	72	73	113	111	110	123	86	88	107	127
158	45,000	1.413	.72	303	509	11,666	19	75	17.6	133	122	83	4.1	77	77	73	73	121	111	110	128	91	91	114	130

[a]Data not obtained for pump-inlet and pump-outlet pressures because engine governor was not installed.
[b]Data not obtained.

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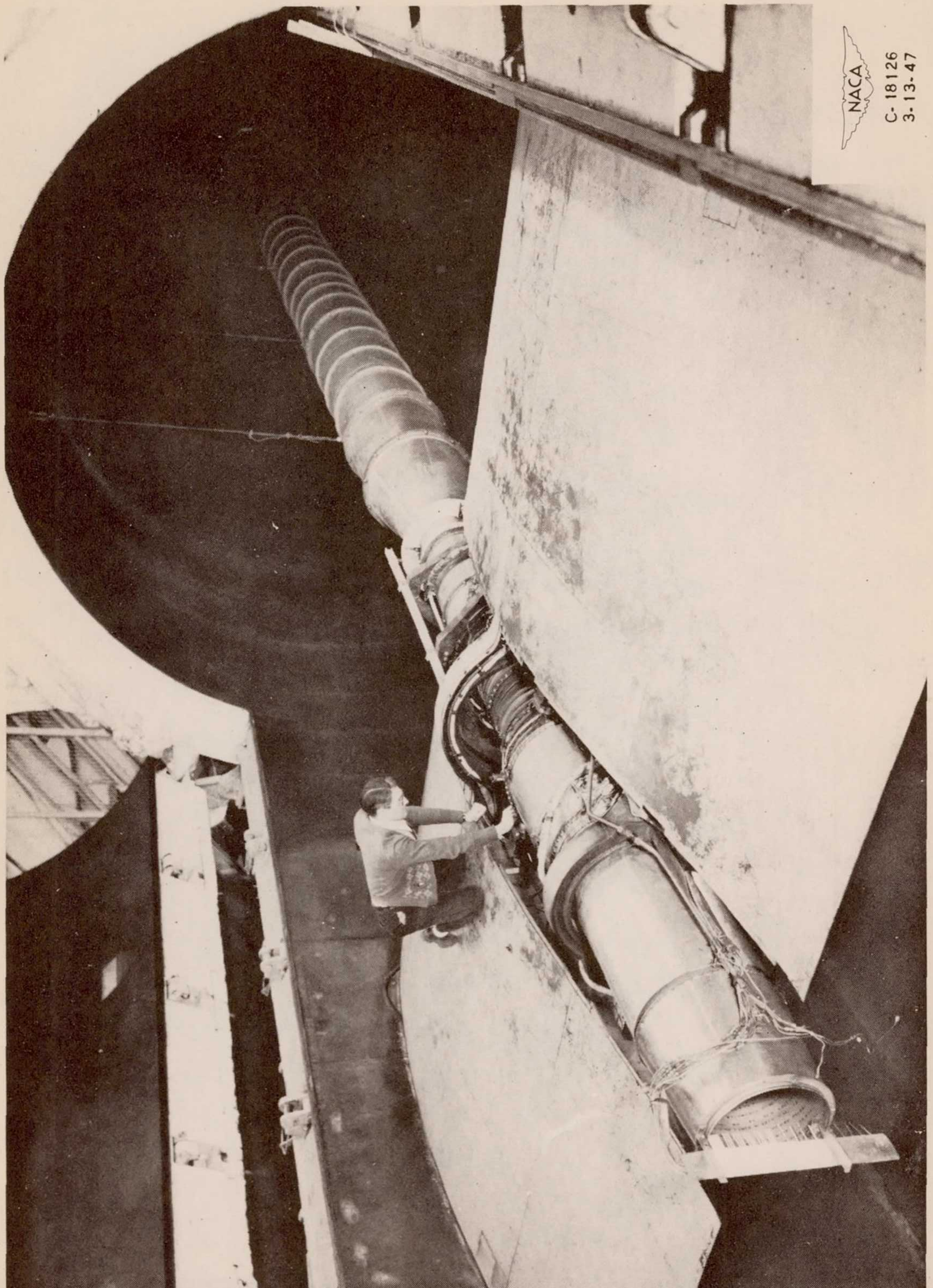
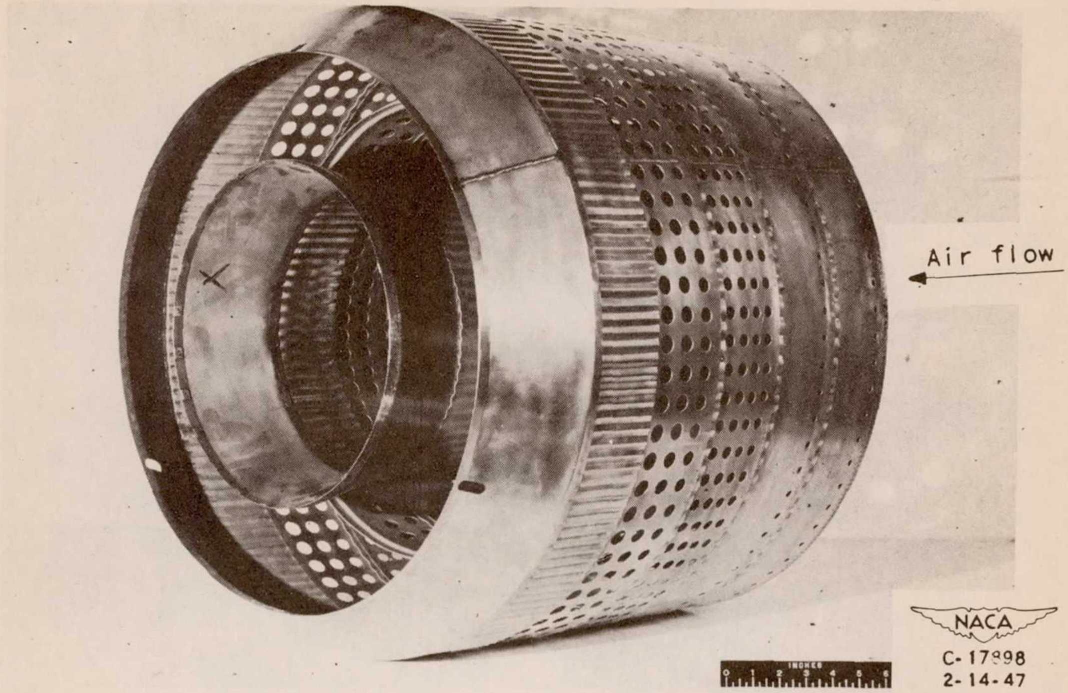
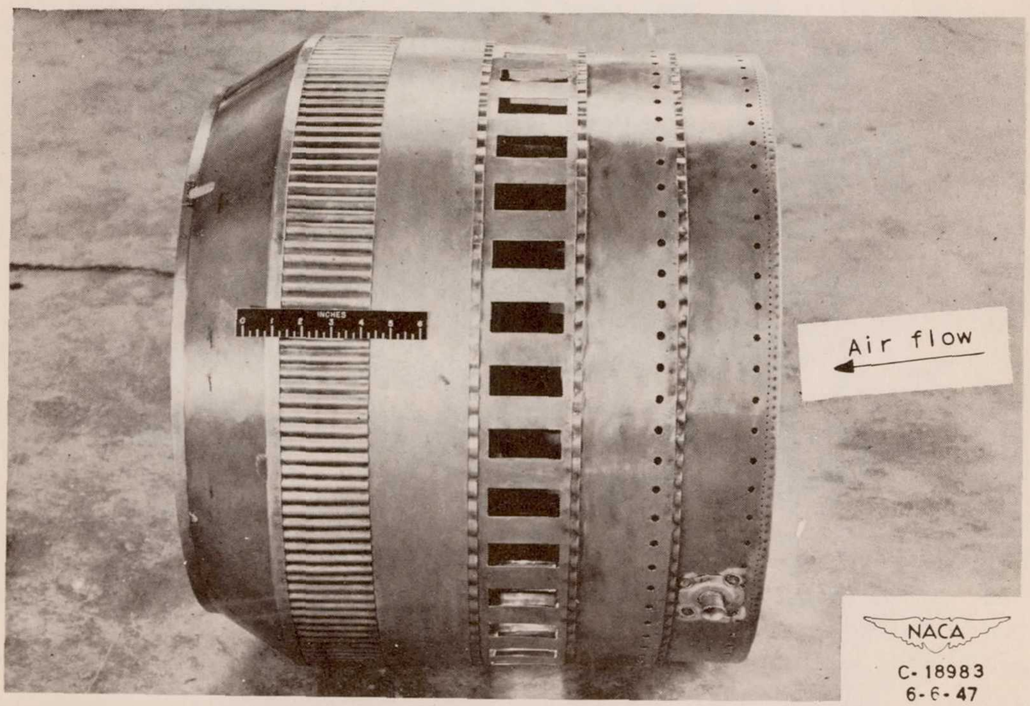


Figure 1. - Installation of X24C-4B turbojet engine in altitude wind tunnel.



(a) Original configuration.

888



(b) Modified configuration.

Figure 2. - Comparison of original and modified combustion chambers.

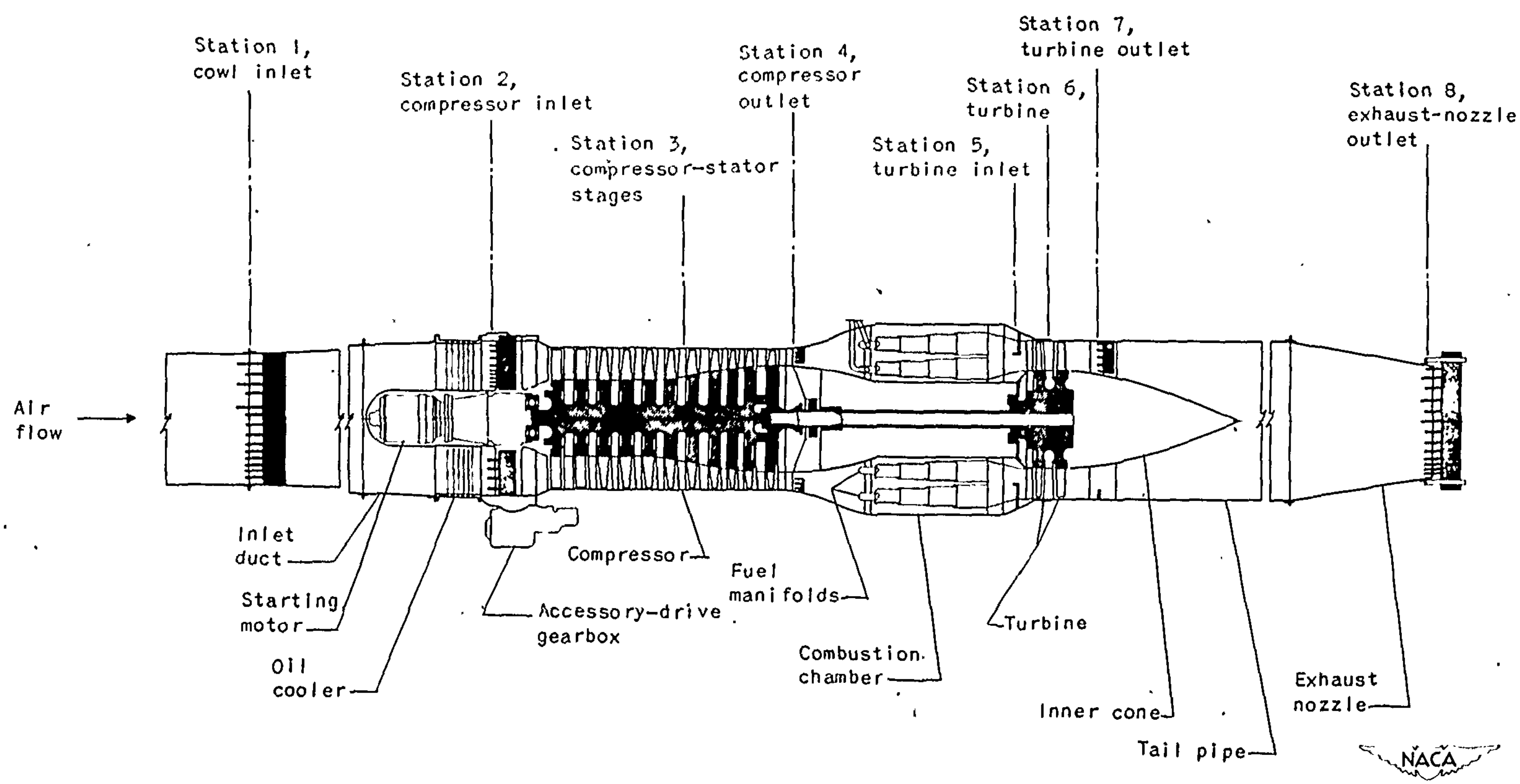


Figure 3. - Location of instrumentation installed in X24C-4B turbojet engine.

[redacted]

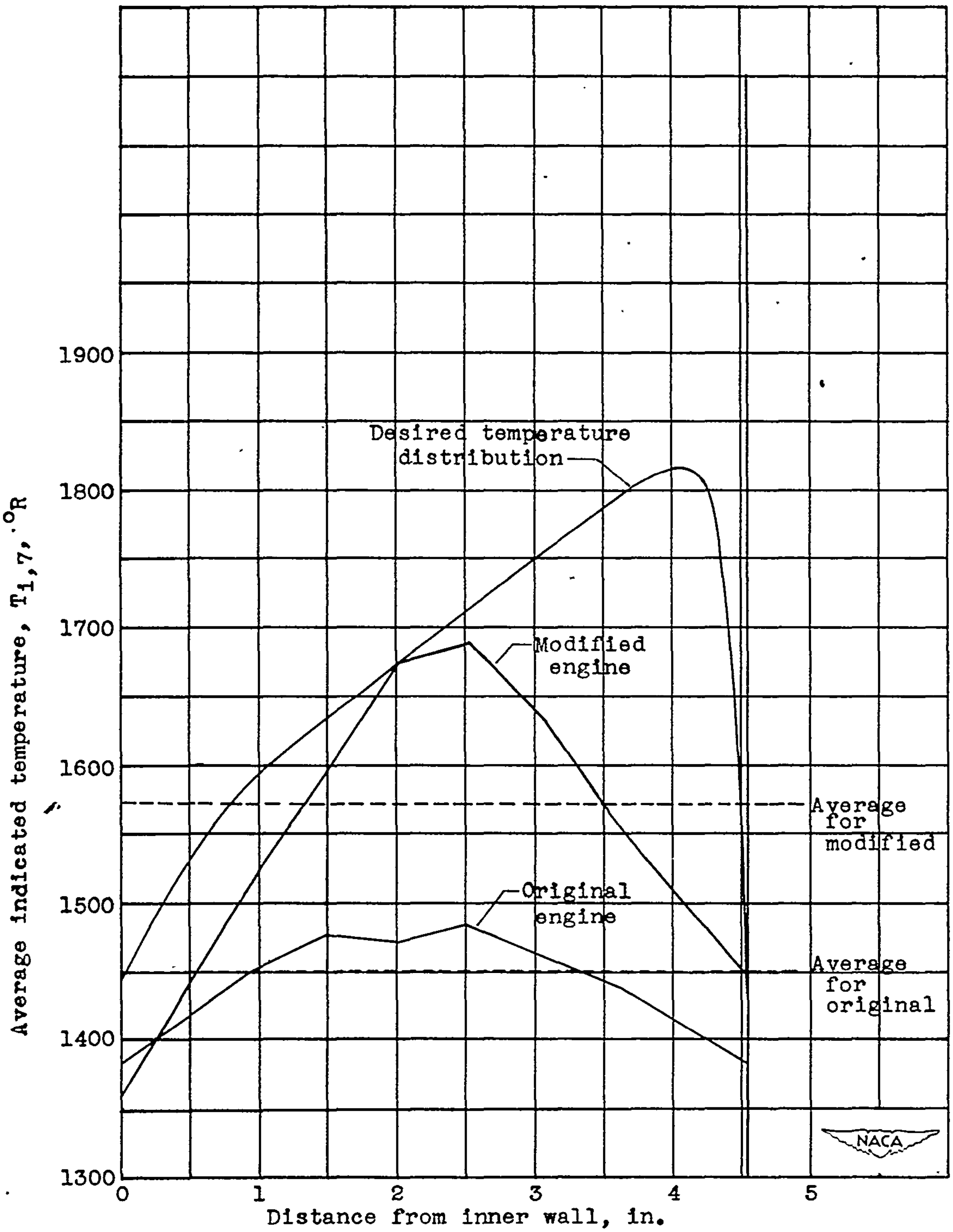
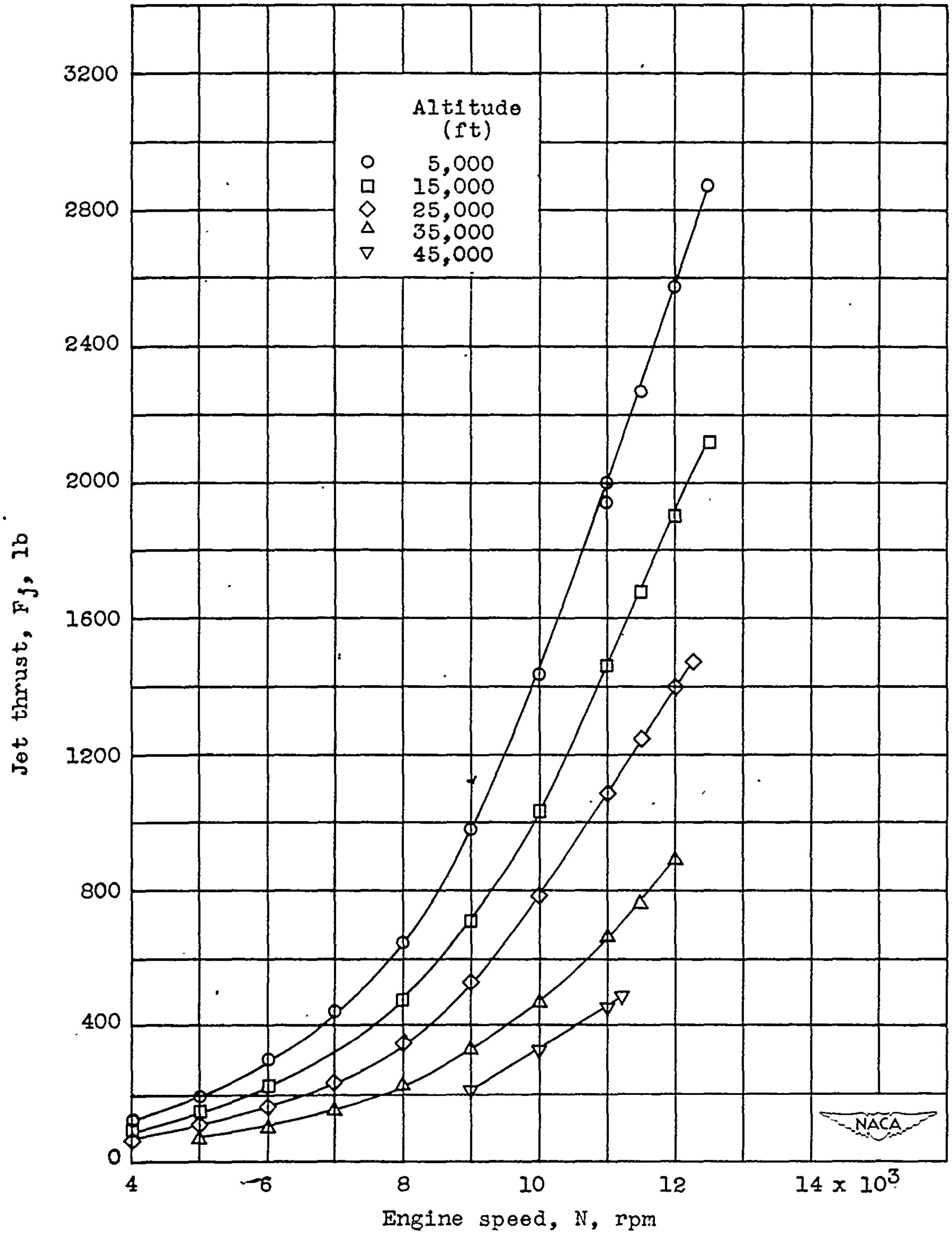
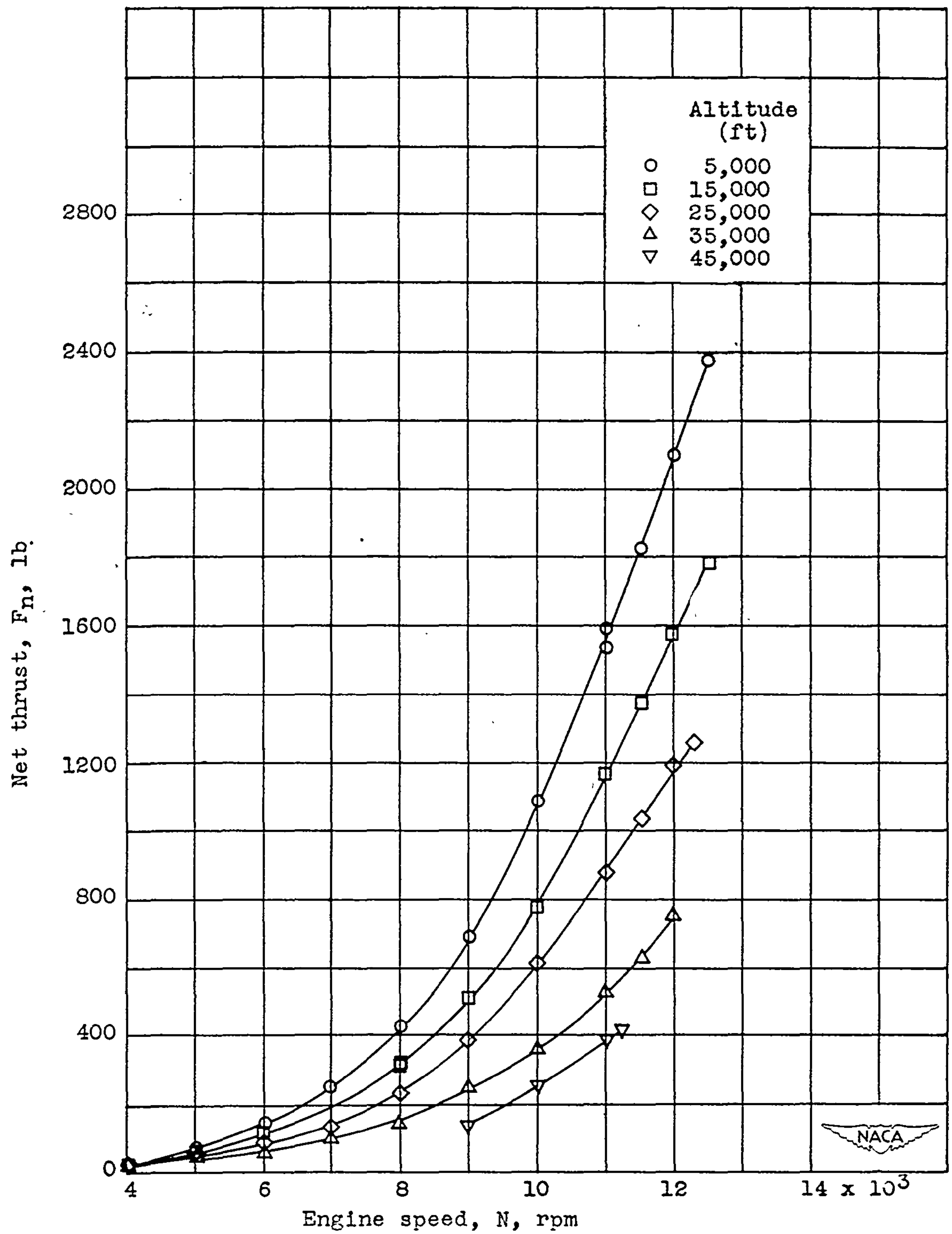


Figure 4. - Comparison of average temperature patterns at turbine outlet for original and modified engines and relation to manufacturer's desired temperature distribution as calculated from blade stress considerations. Altitude, 5000 feet; engine speed, 12,500 rpm; Mach number, 0.25.



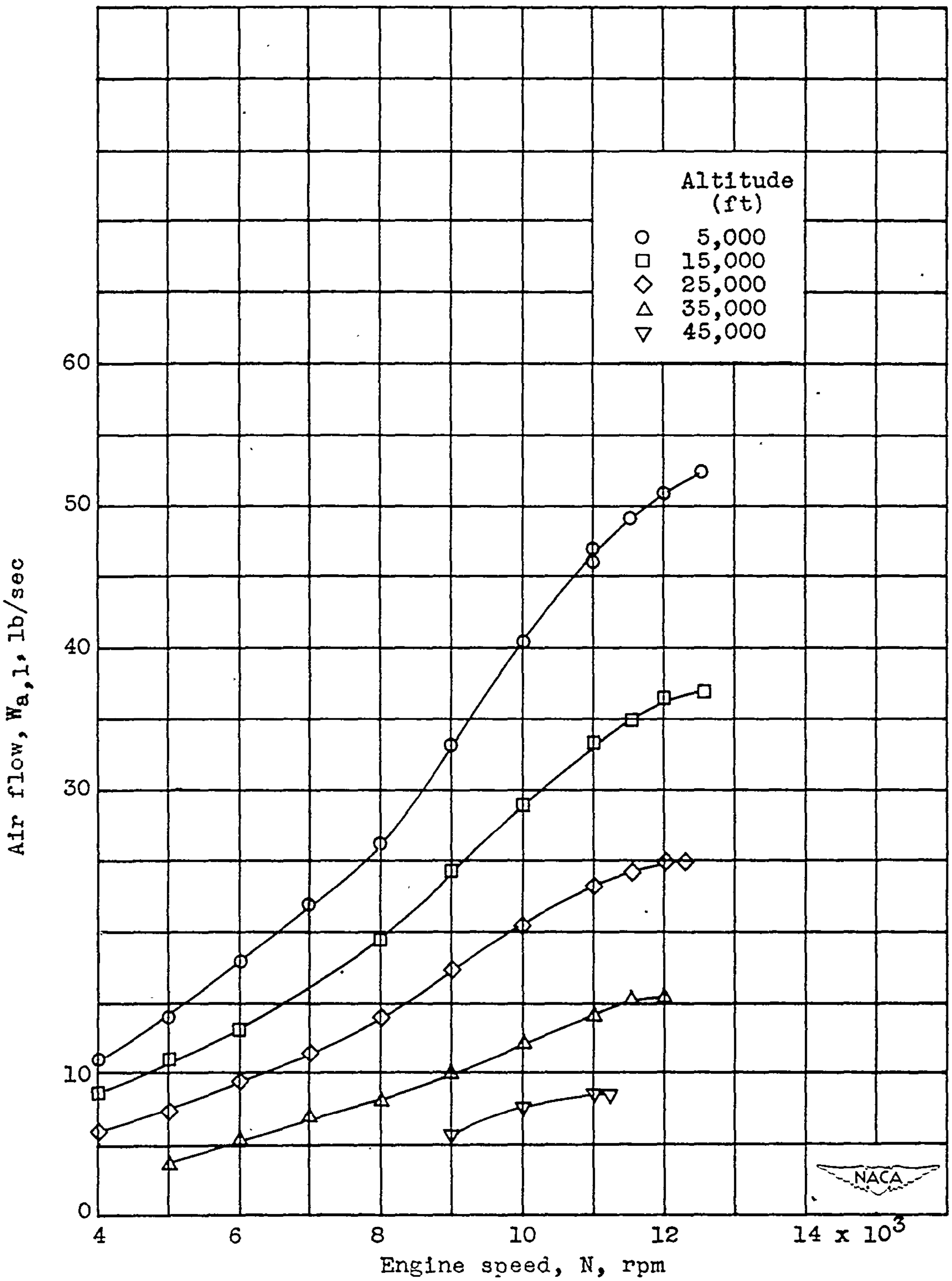
(a) Jet thrust.

Figure 5. - Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



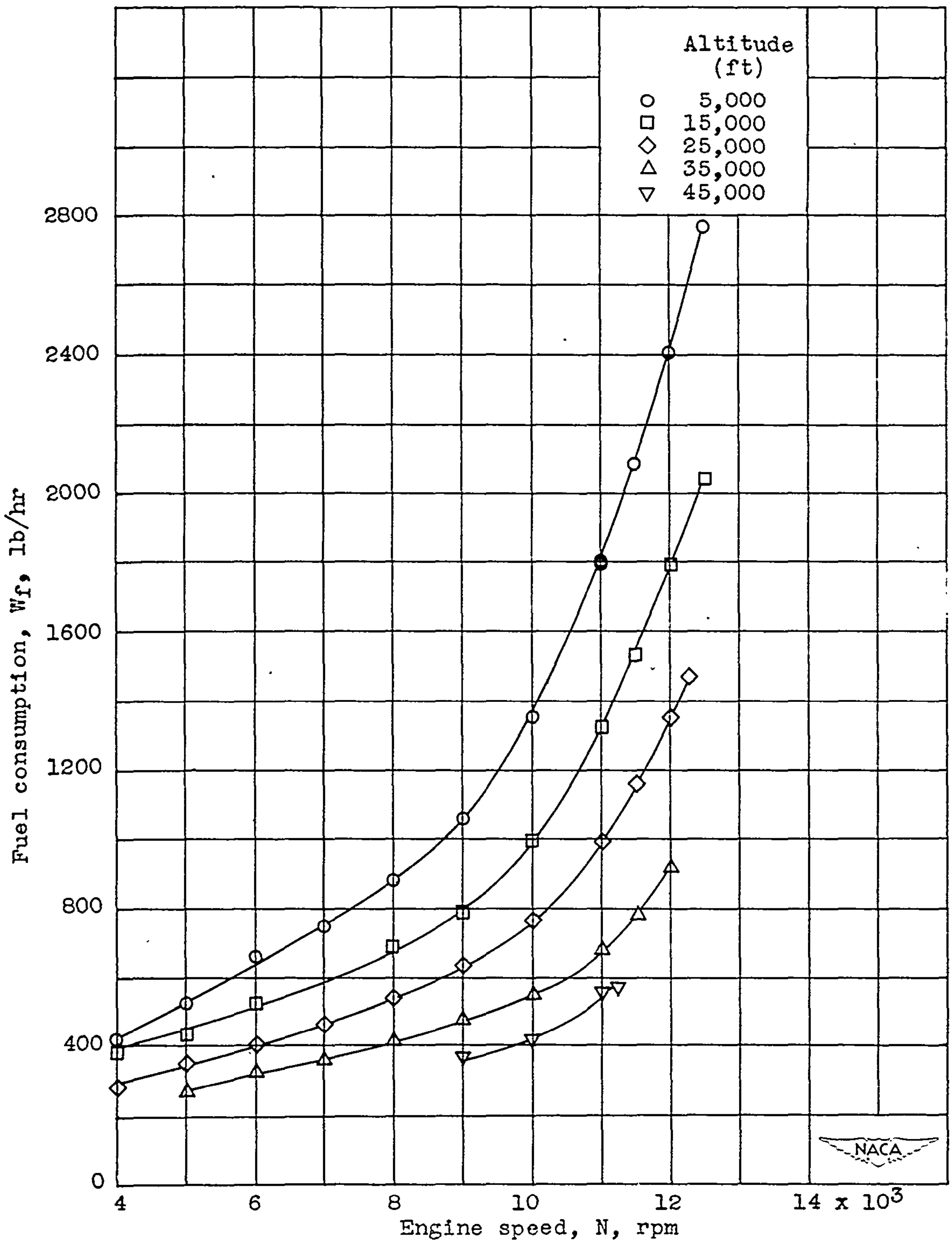
(b) Net thrust.

Figure 5. - Continued. Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



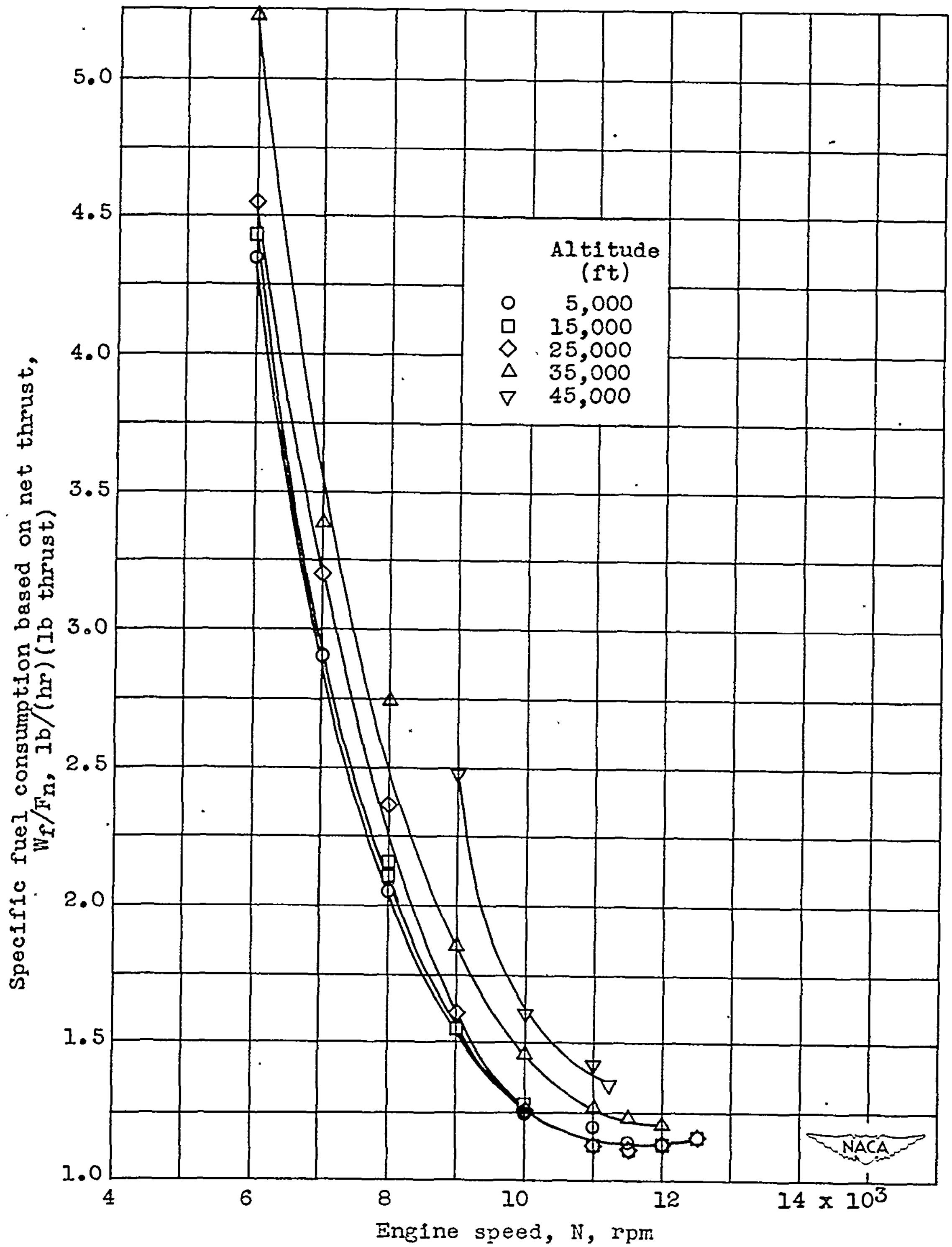
(c) Air flow.

Figure 5. - Continued. Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



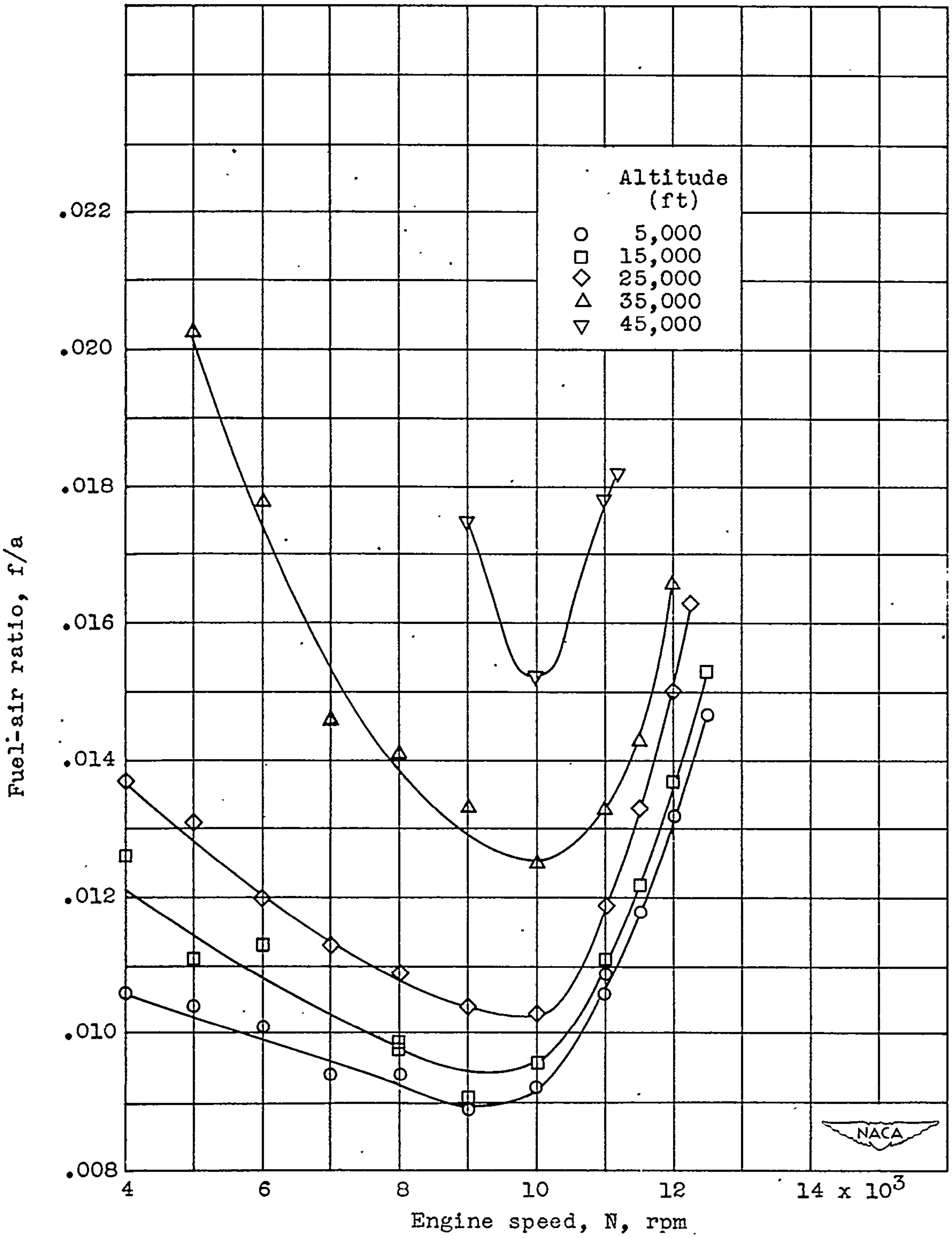
(d) Fuel consumption

Figure 5. - Continued. Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



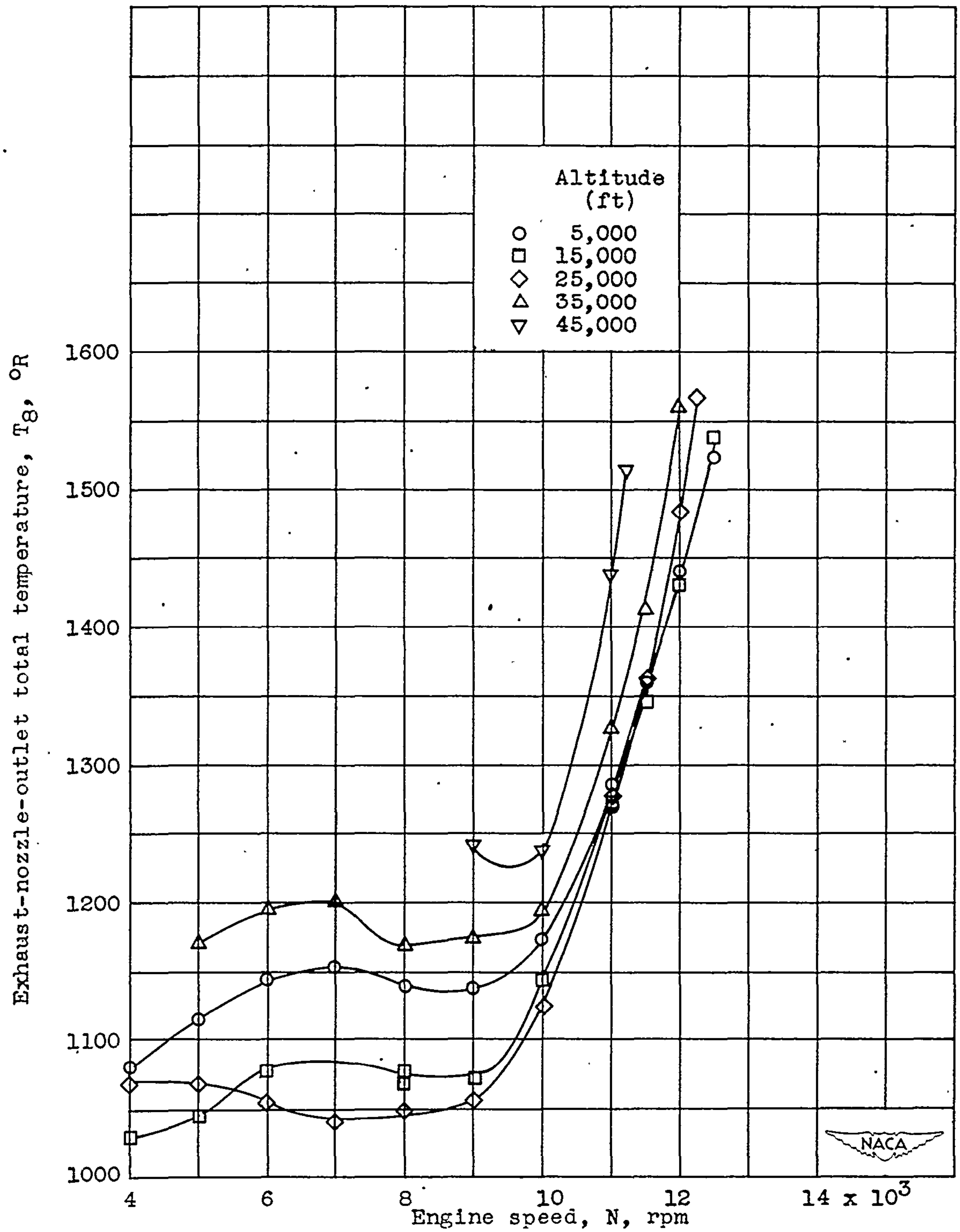
(e) Specific fuel consumption based on net thrust.

Figure 5. - Continued. Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



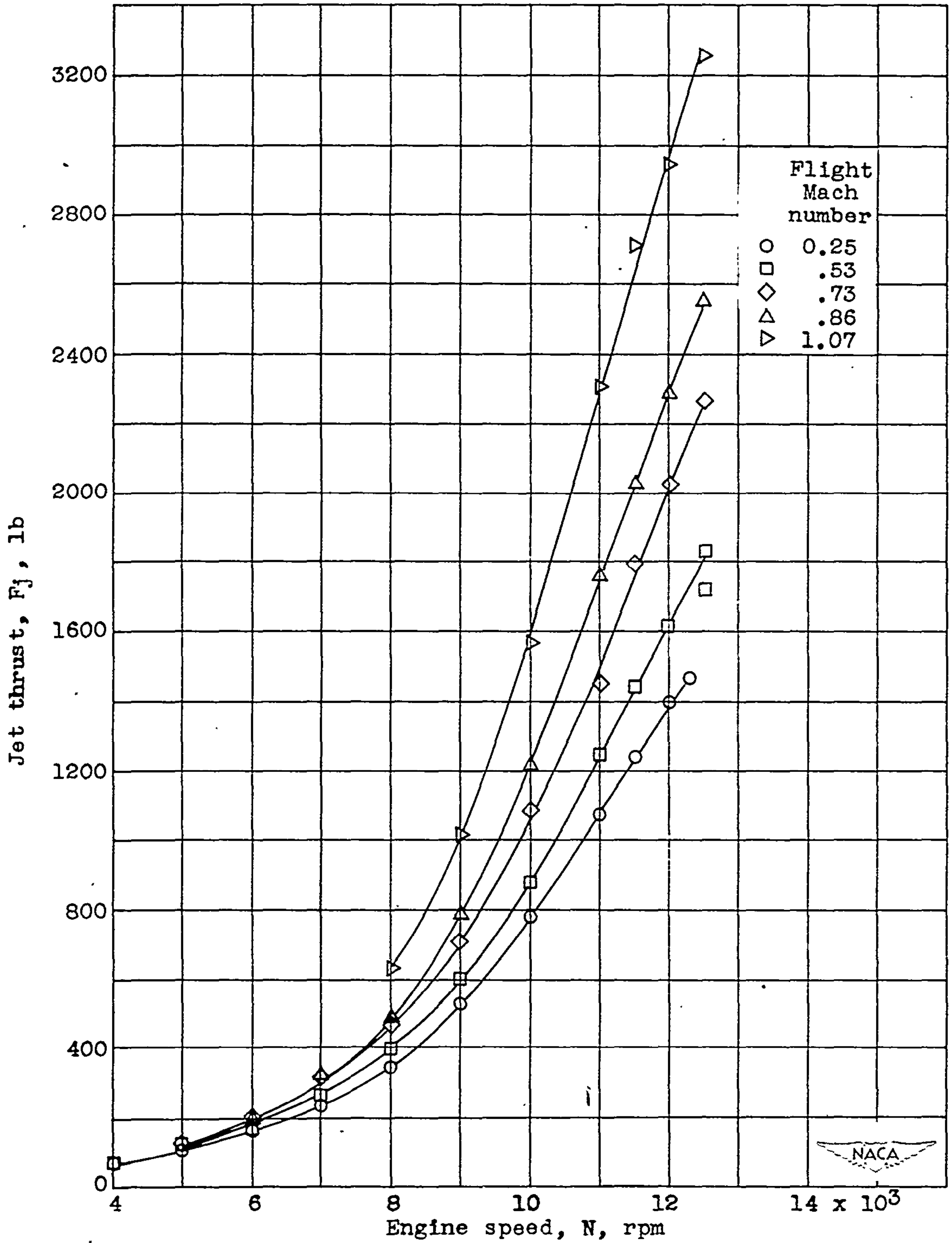
(f) Fuel-air ratio.

Figure 5. - Continued. Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



(g) Exhaust-nozzle-outlet total temperature.

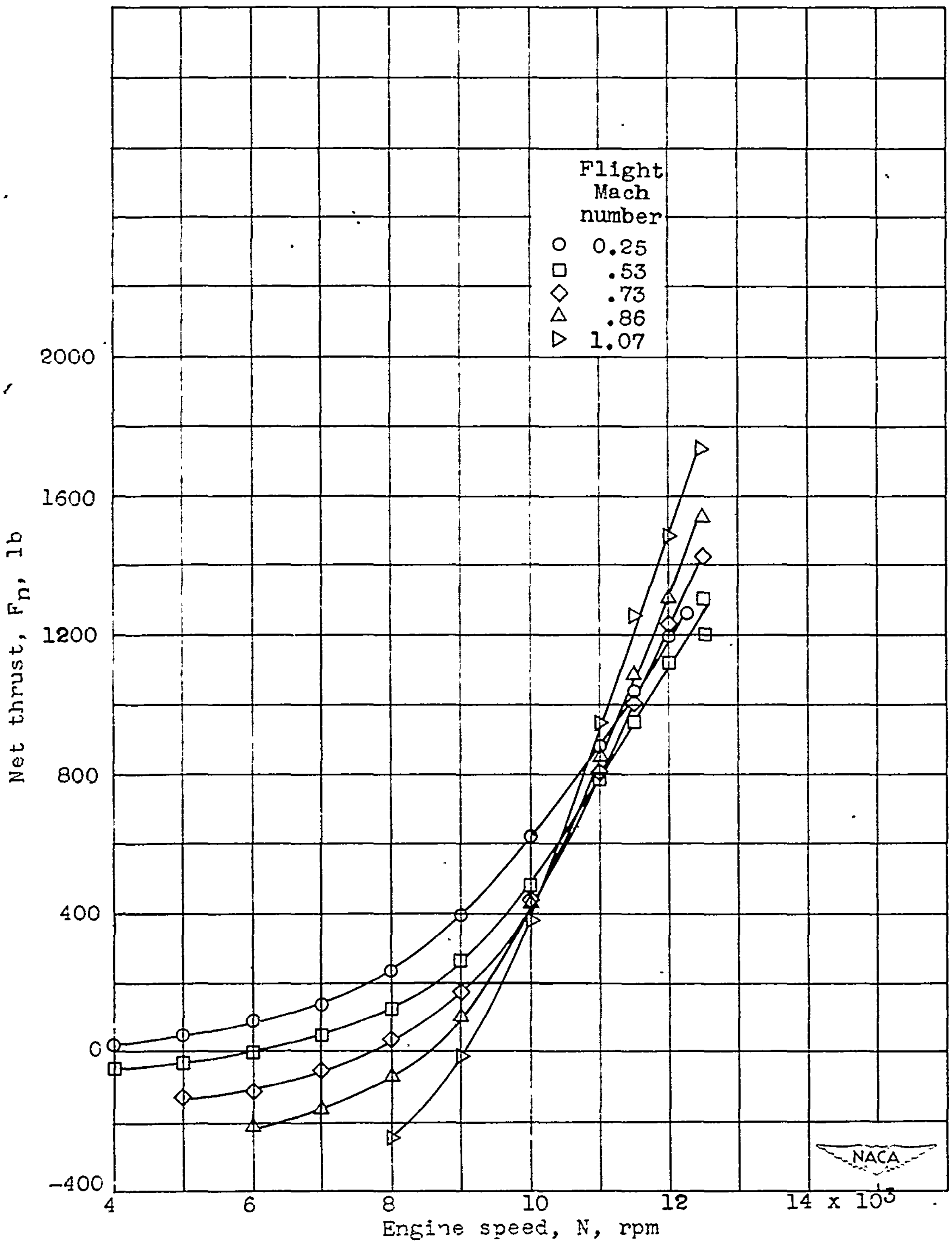
Figure 5. - Concluded. Effect of altitude on variation of turbojet engine performance with engine speed. Flight Mach number, 0.25.



(a) Jet thrust.

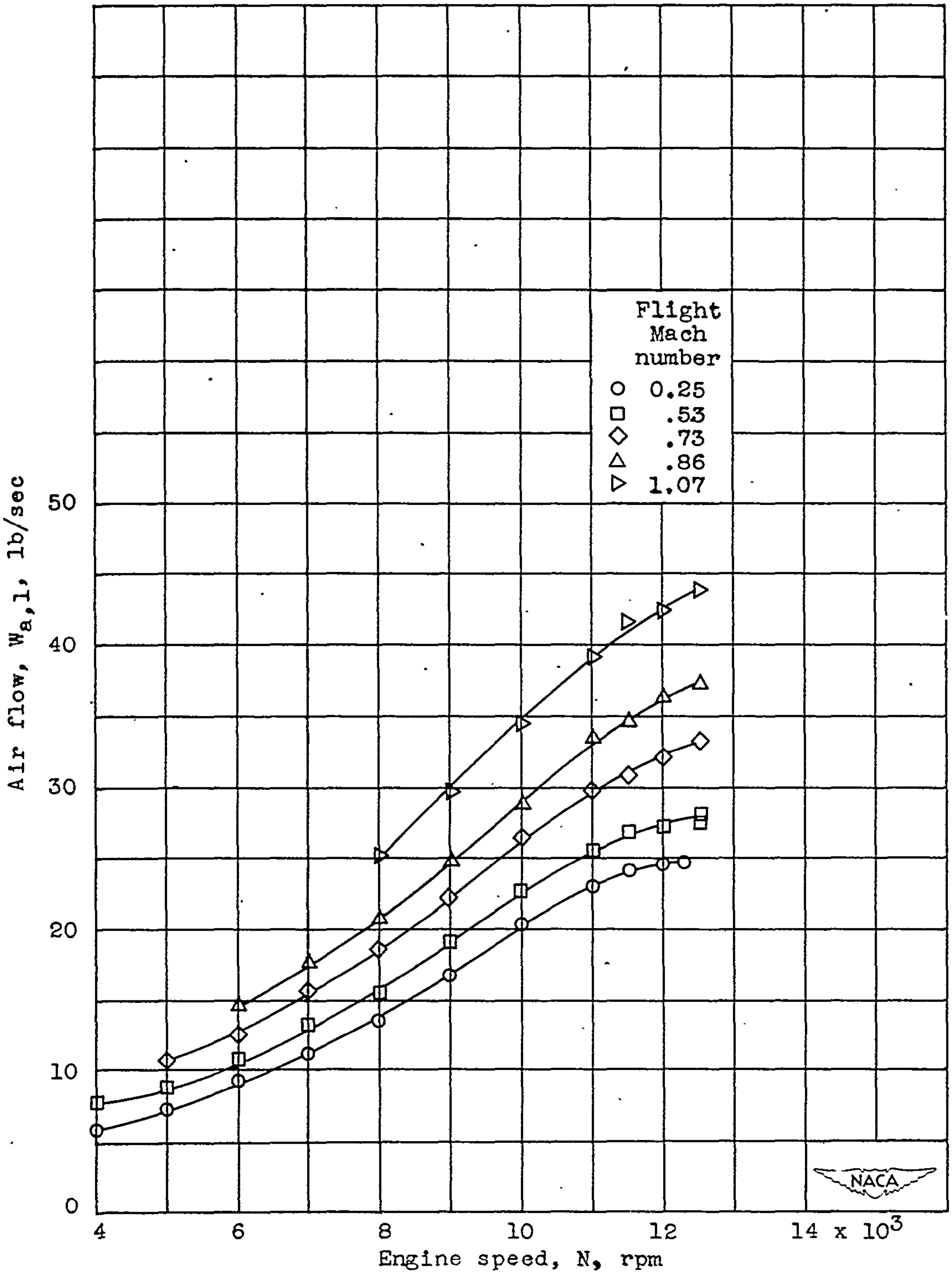
Figure 6. - Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.

[redacted]



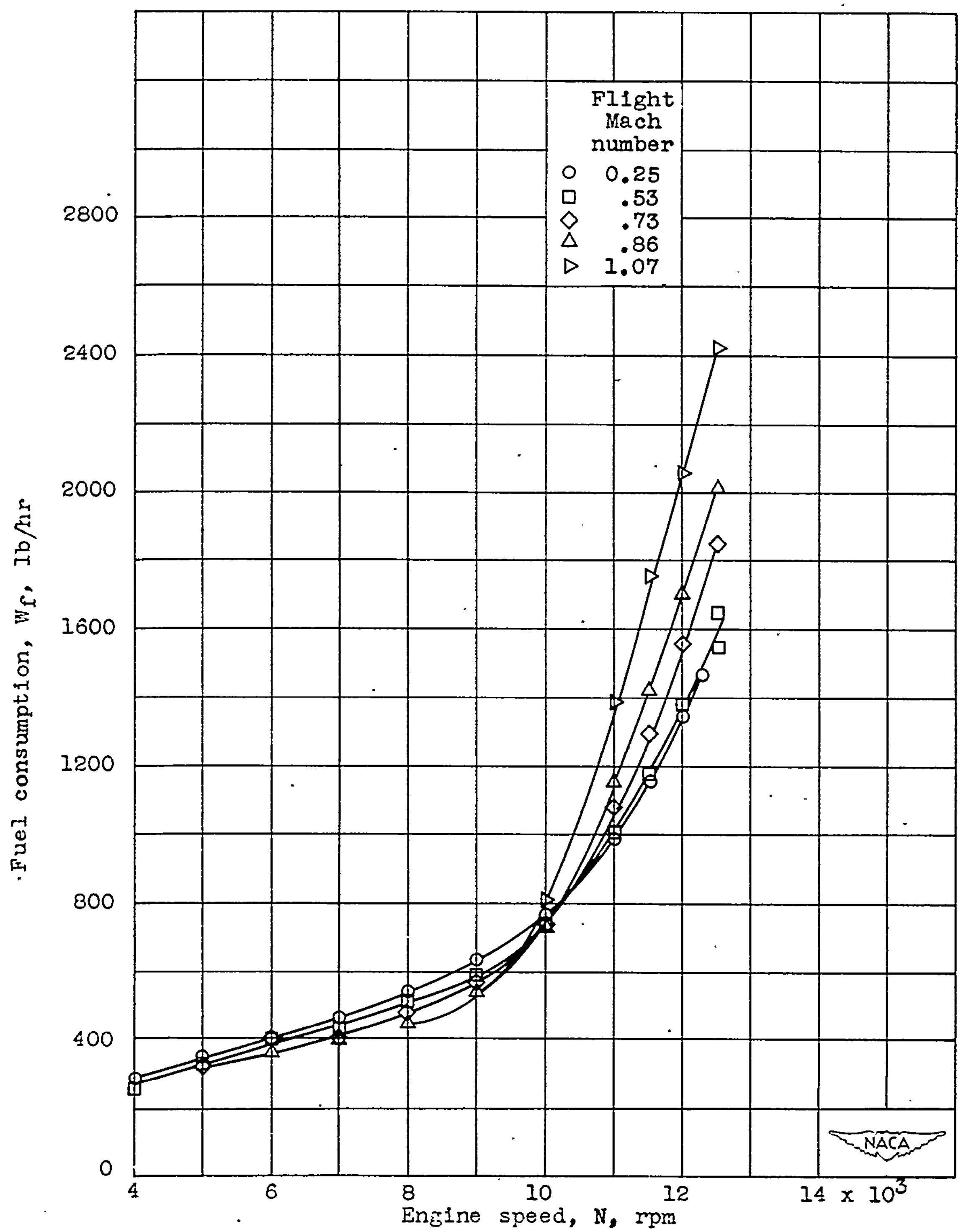
(b) Net thrust.

Figure 6. - Continued. Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.



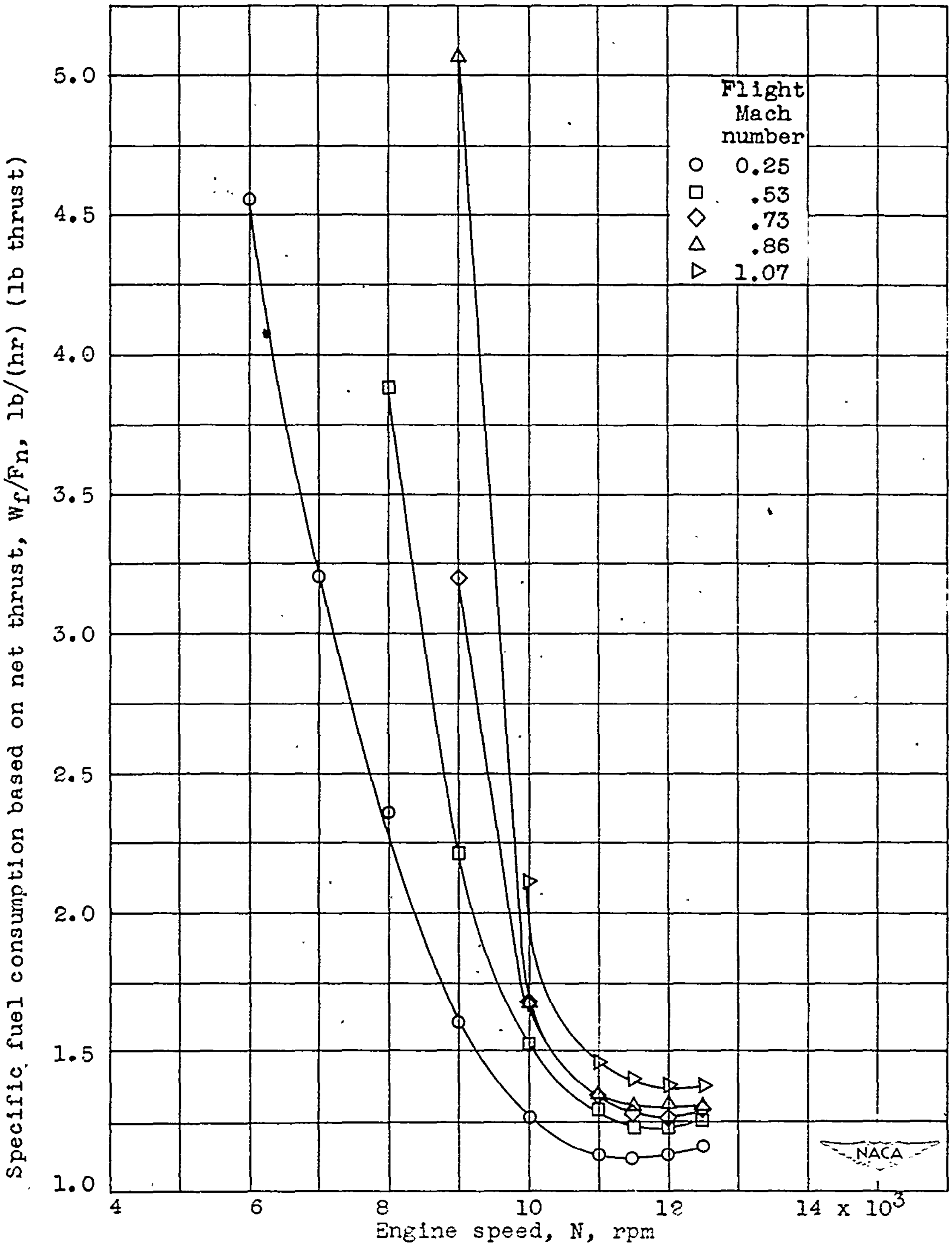
(c) Air flow.

Figure 6. - Continued. Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.



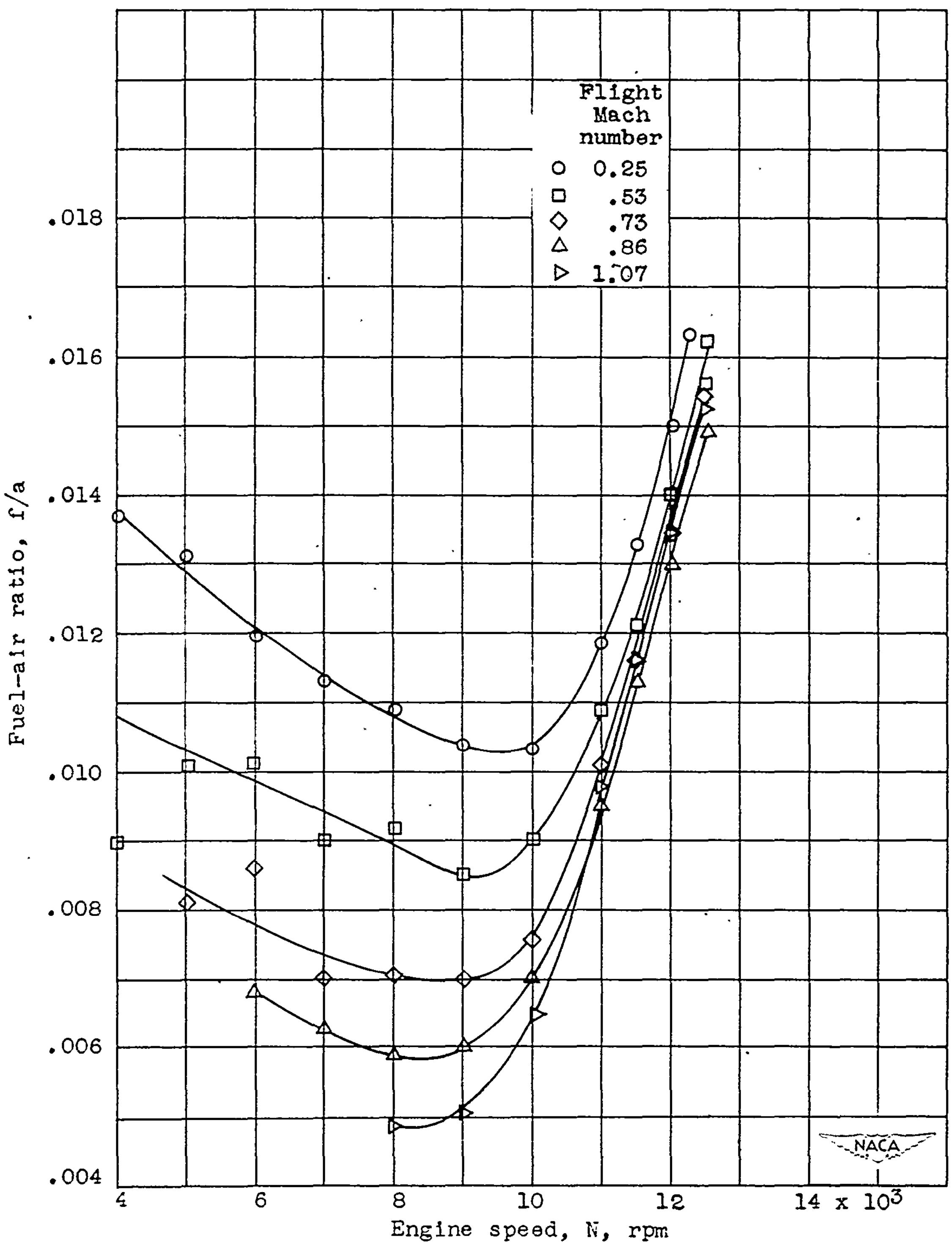
(d) Fuel consumption.

Figure 6. - Continued. Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.



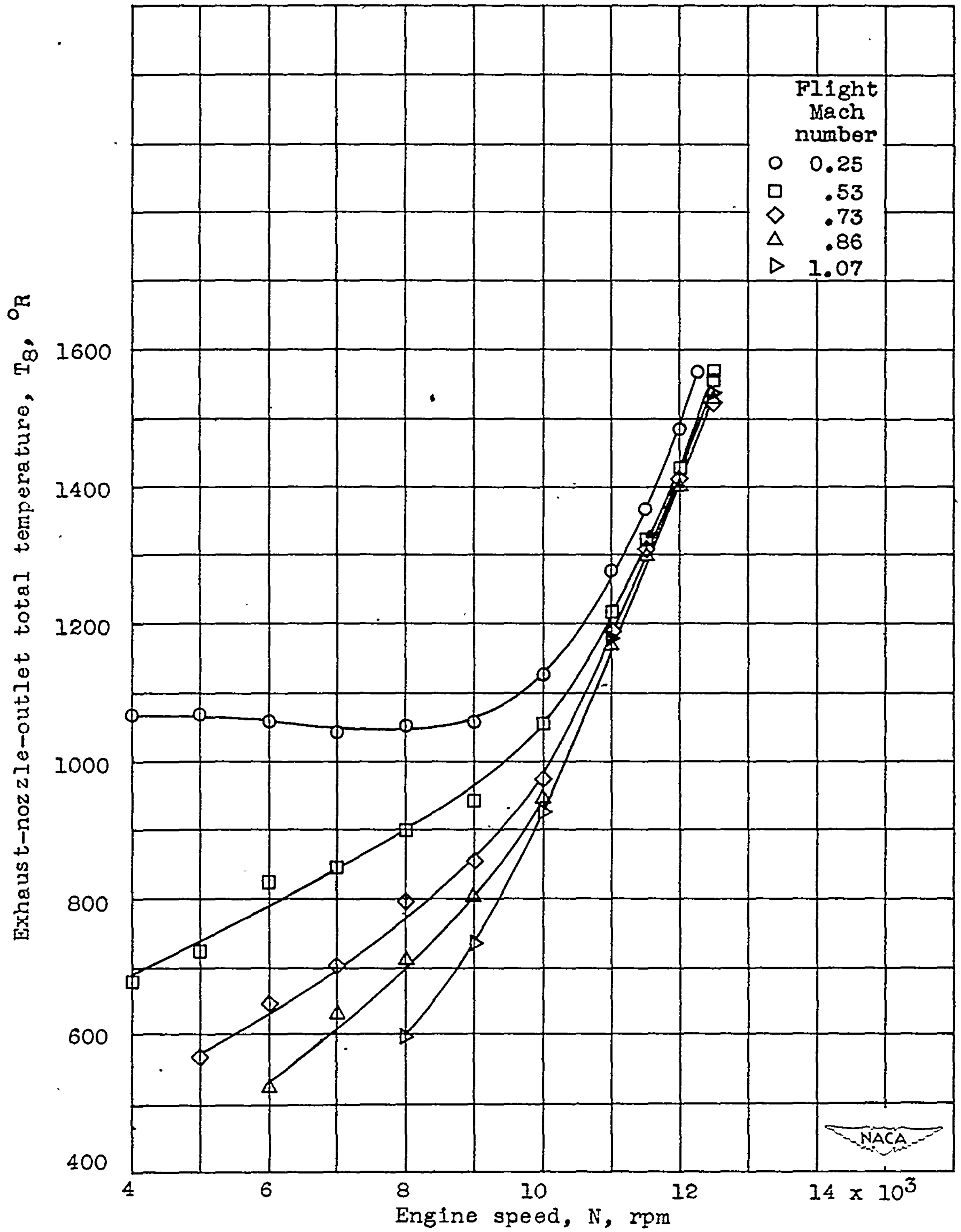
(e) Specific fuel consumption based on net thrust.

Figure 6. - Continued. Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.



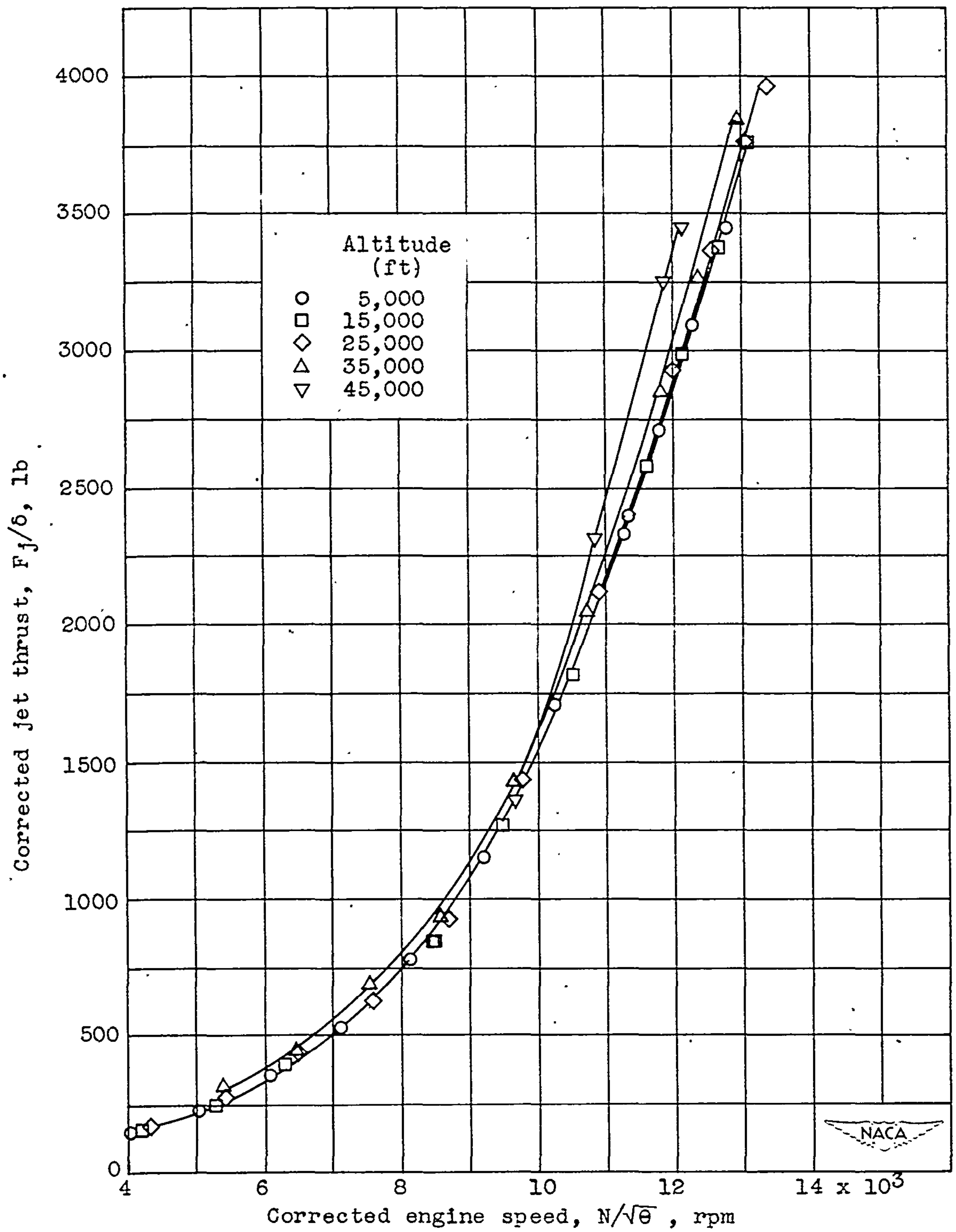
(f) Fuel-air ratio.

Figure 6. - Continued. Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.



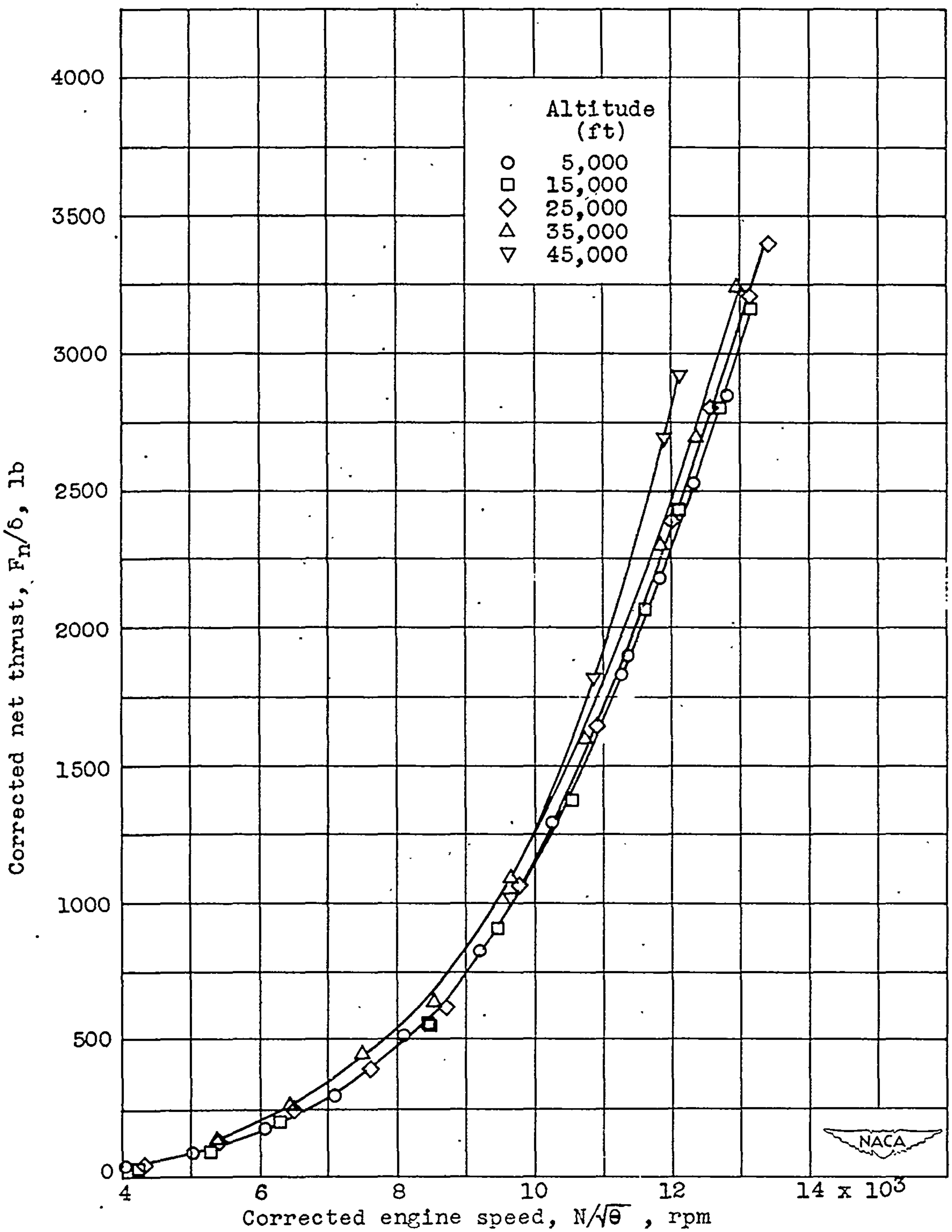
(g) Exhaust-nozzle-outlet total temperature.

Figure 6. - Concluded. Effect of flight Mach number on variation of turbojet engine performance with engine speed. Altitude, 25,000 feet.



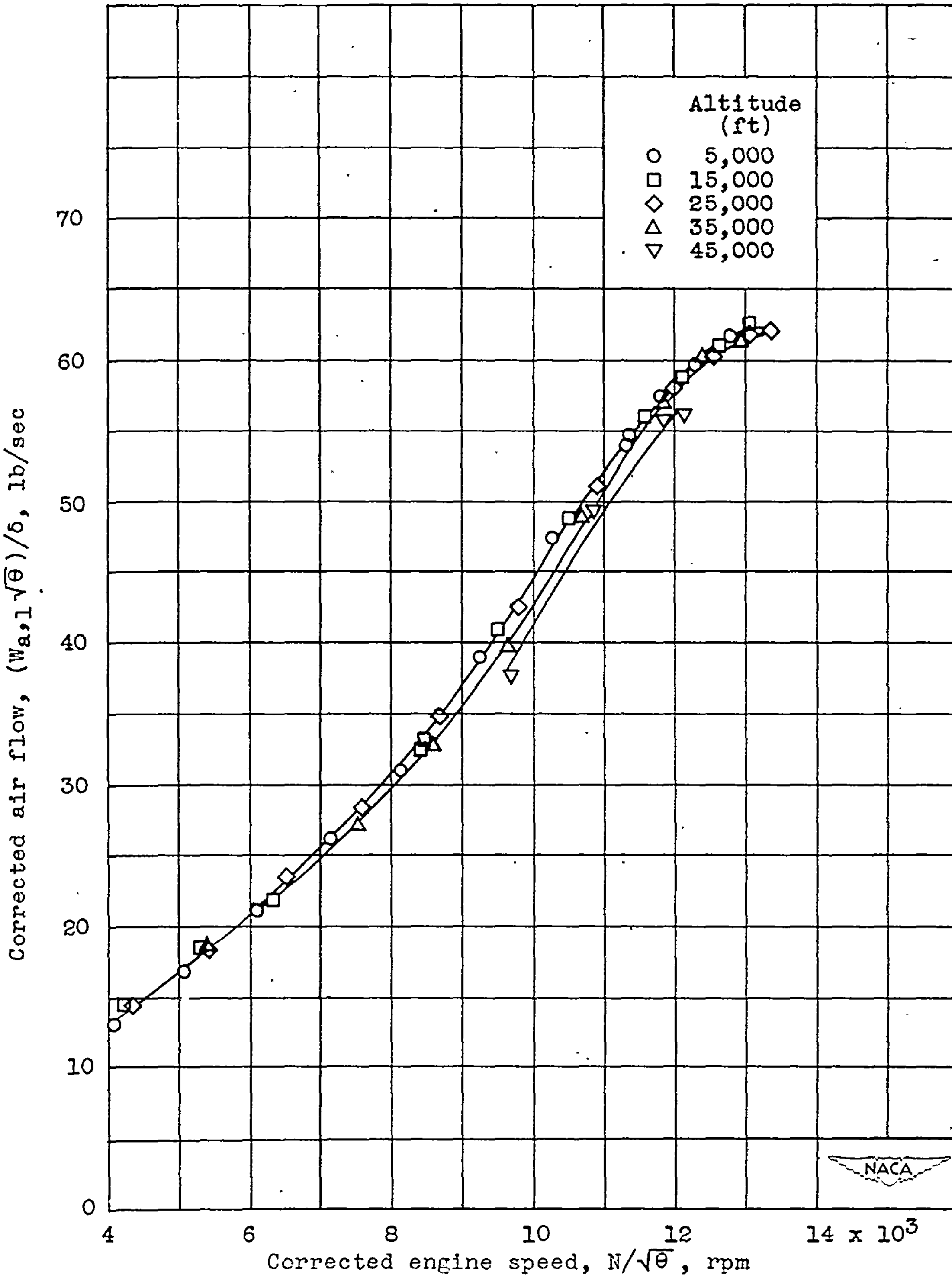
(a) Corrected jet thrust.

Figure 7. - Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



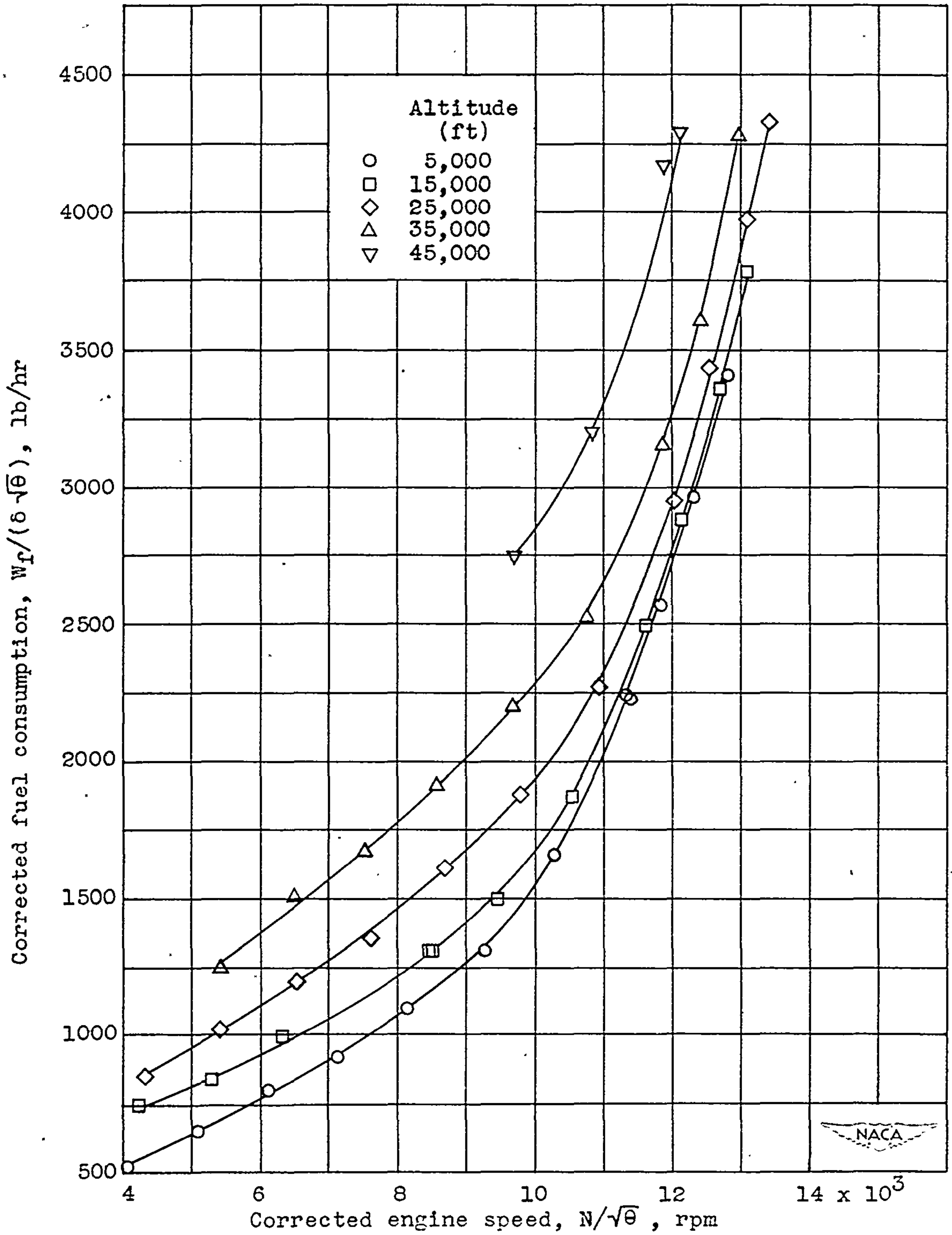
(b) Corrected net thrust.

Figure 7. - Continued. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



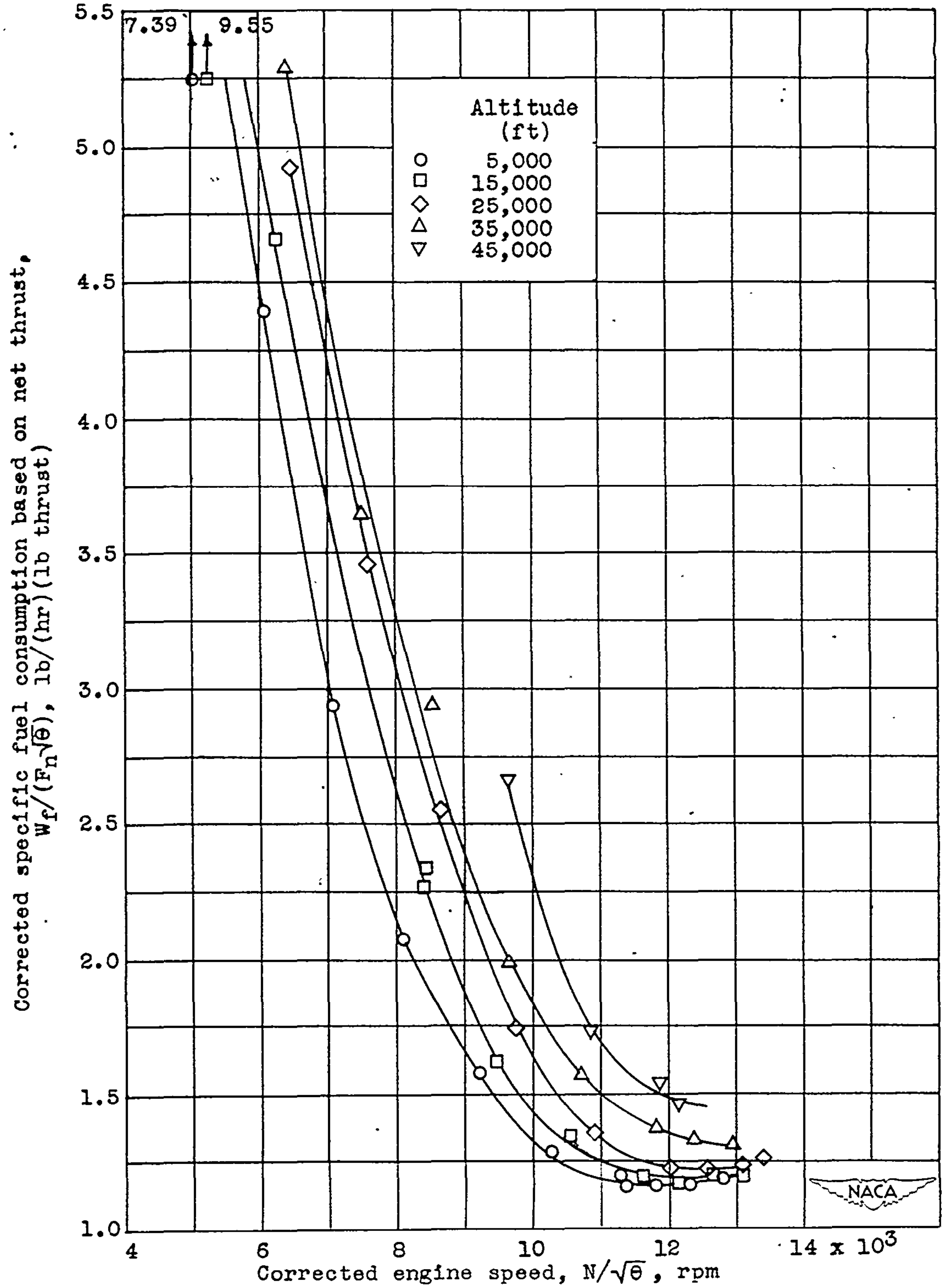
(c) Corrected air flow.

Figure 7. - Continued. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



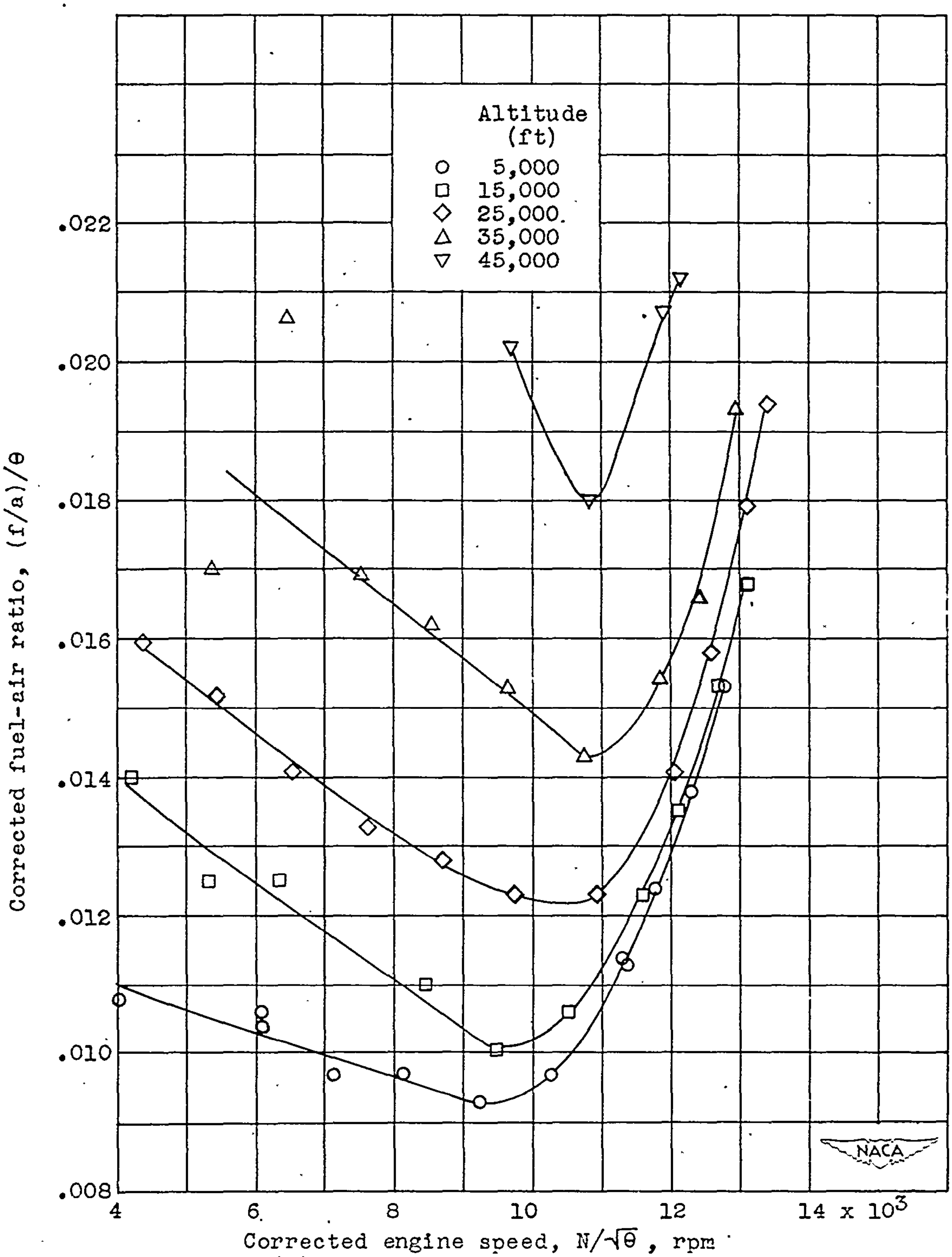
(d) Corrected fuel consumption.

Figure 7. - Continued. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



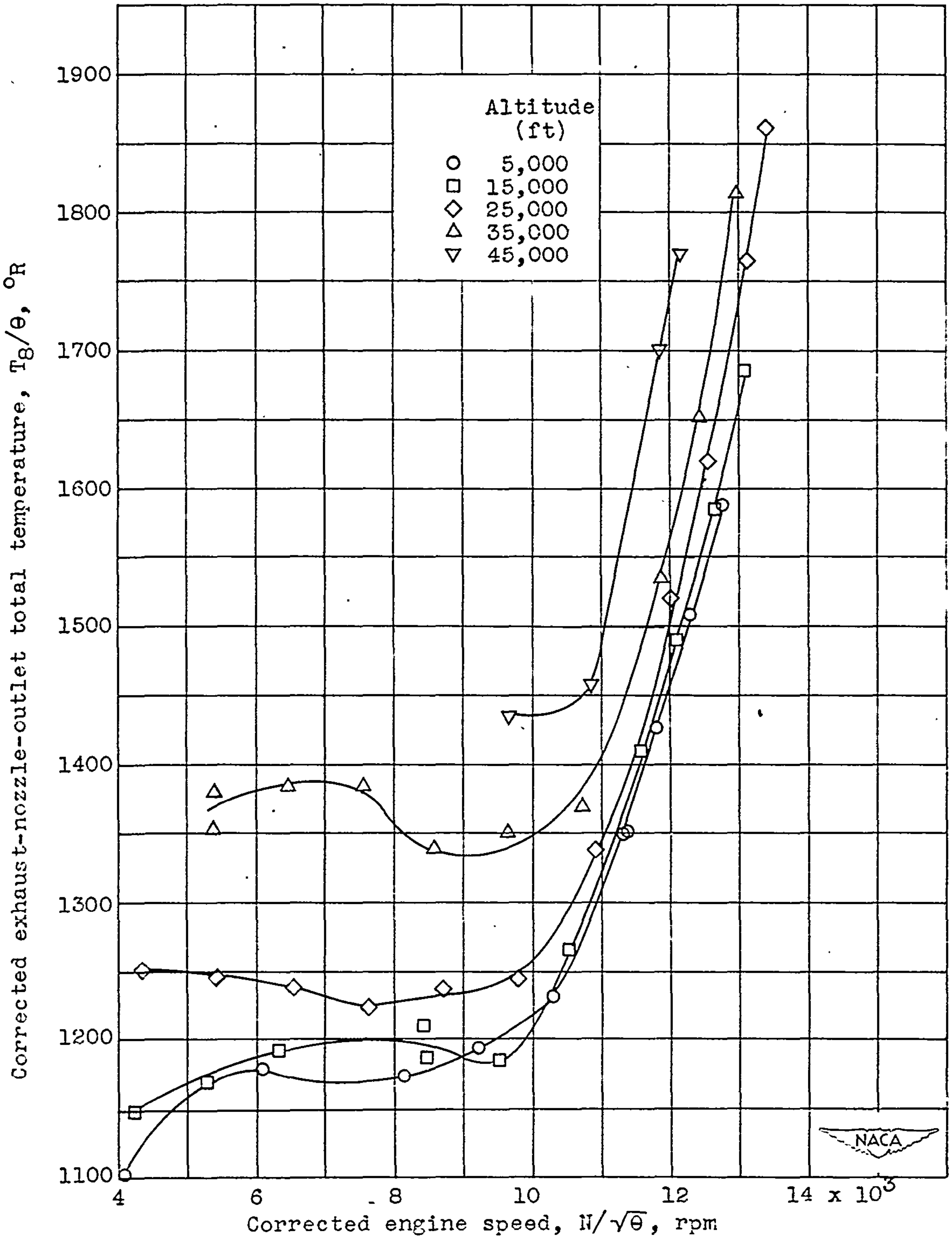
(e) Corrected specific fuel consumption based on net thrust.

Figure 7. - Continued. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



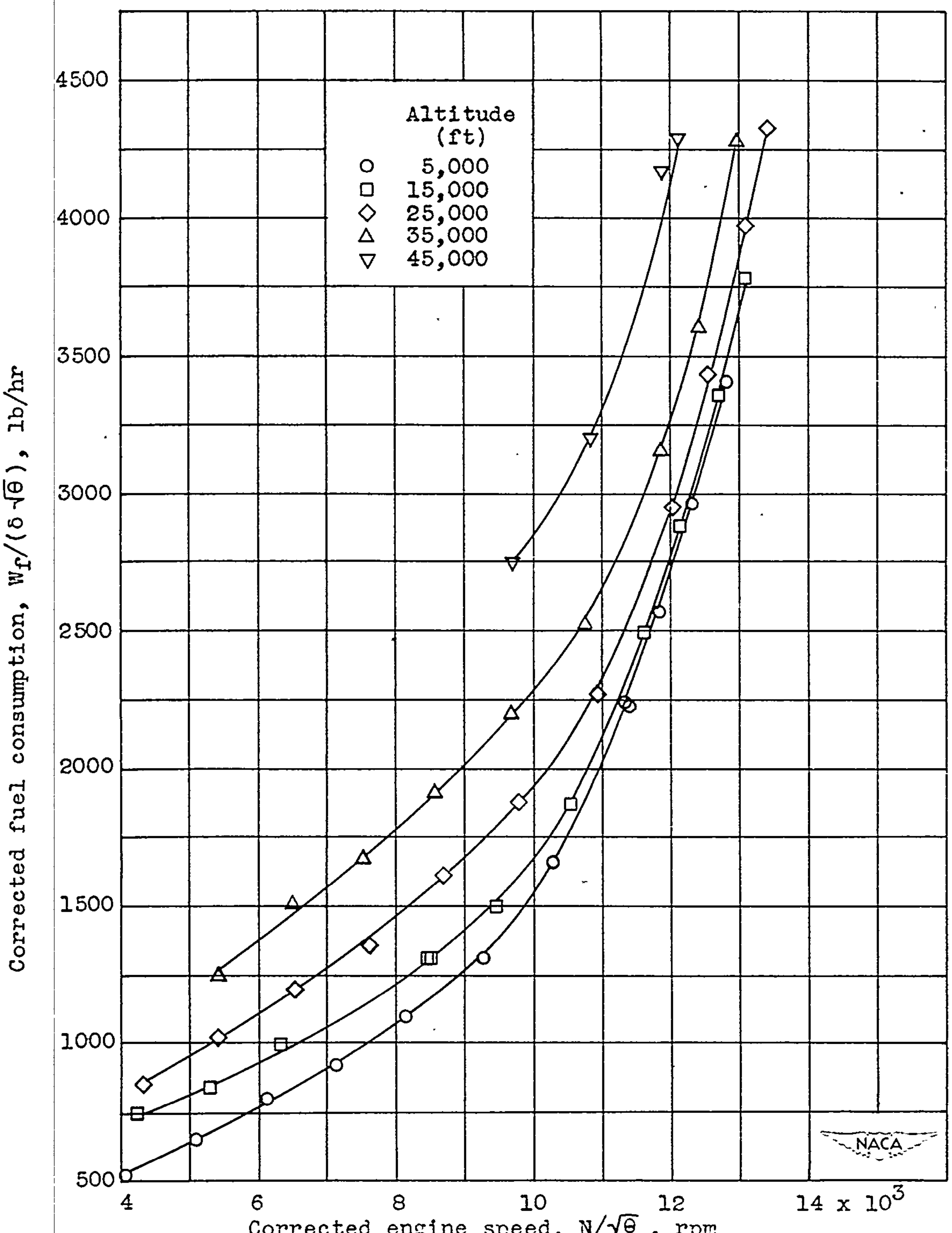
(f) Corrected fuel-air ratio.

Figure 7. - Continued. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



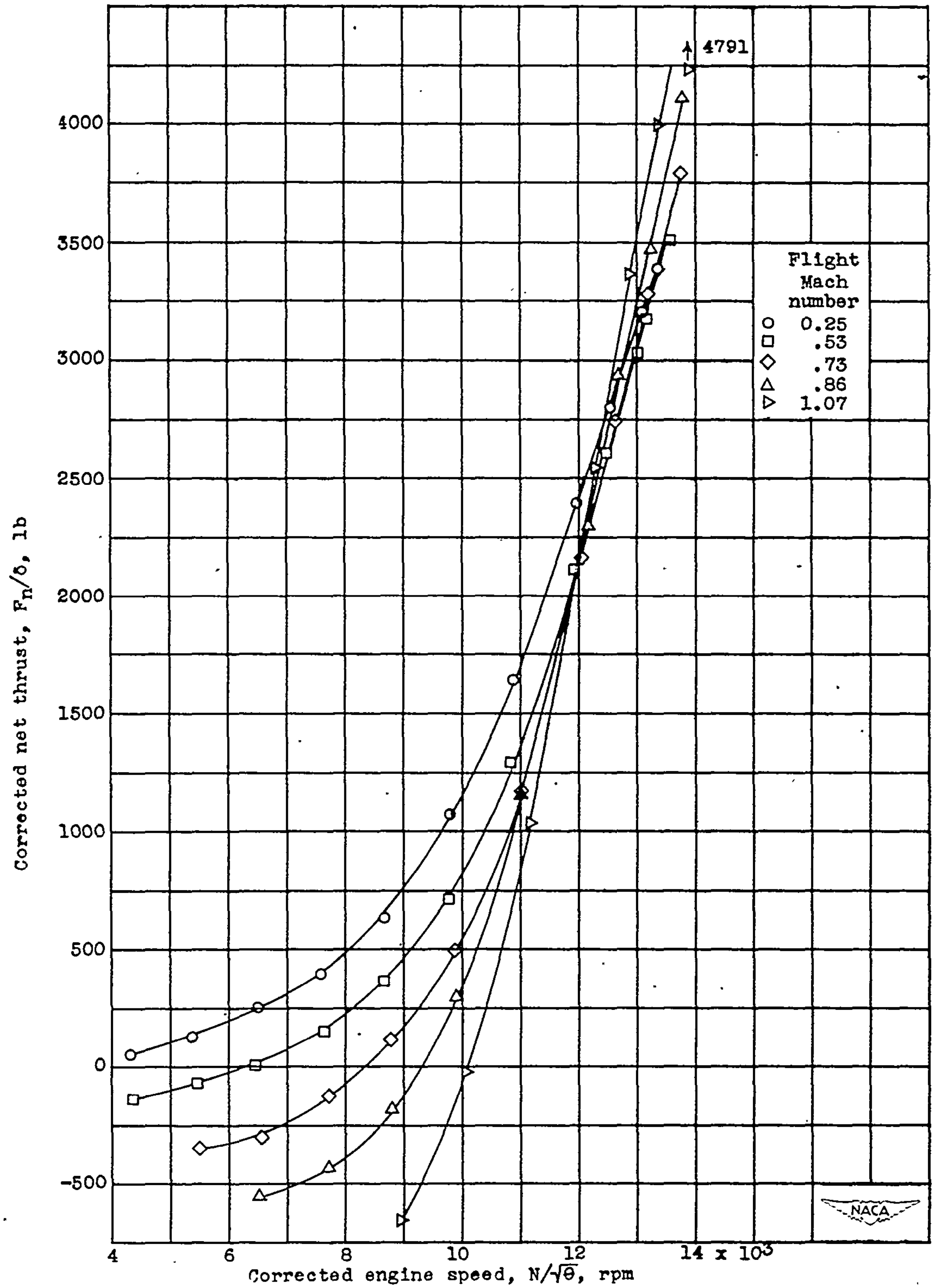
(g) Corrected exhaust-nozzle-outlet total temperature.

Figure 7. - Concluded. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



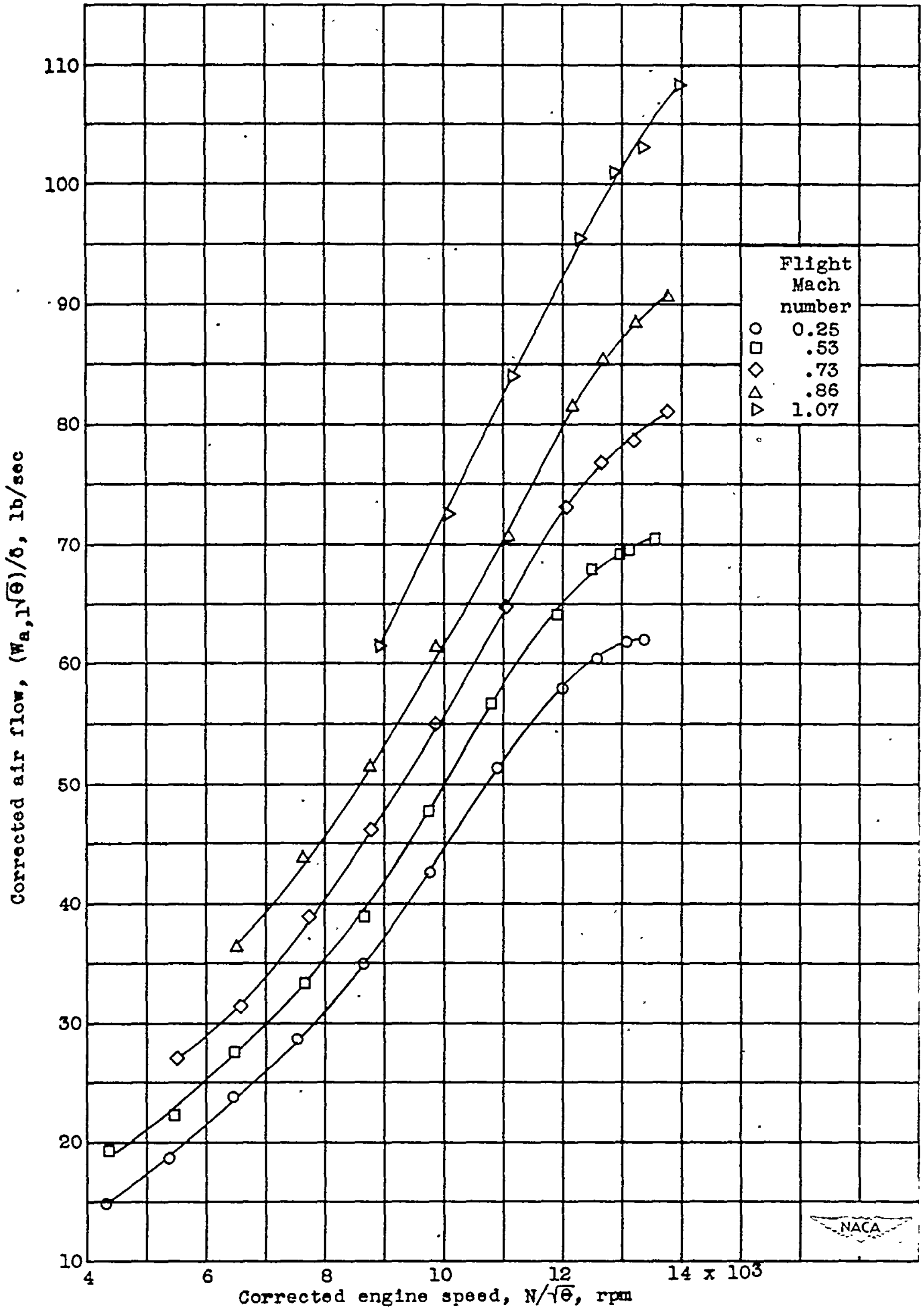
(d) Corrected fuel consumption.

Figure 7. - Continued. Effect of altitude on variation of generalized turbojet engine performance with corrected engine speed. Flight Mach number, 0.25.



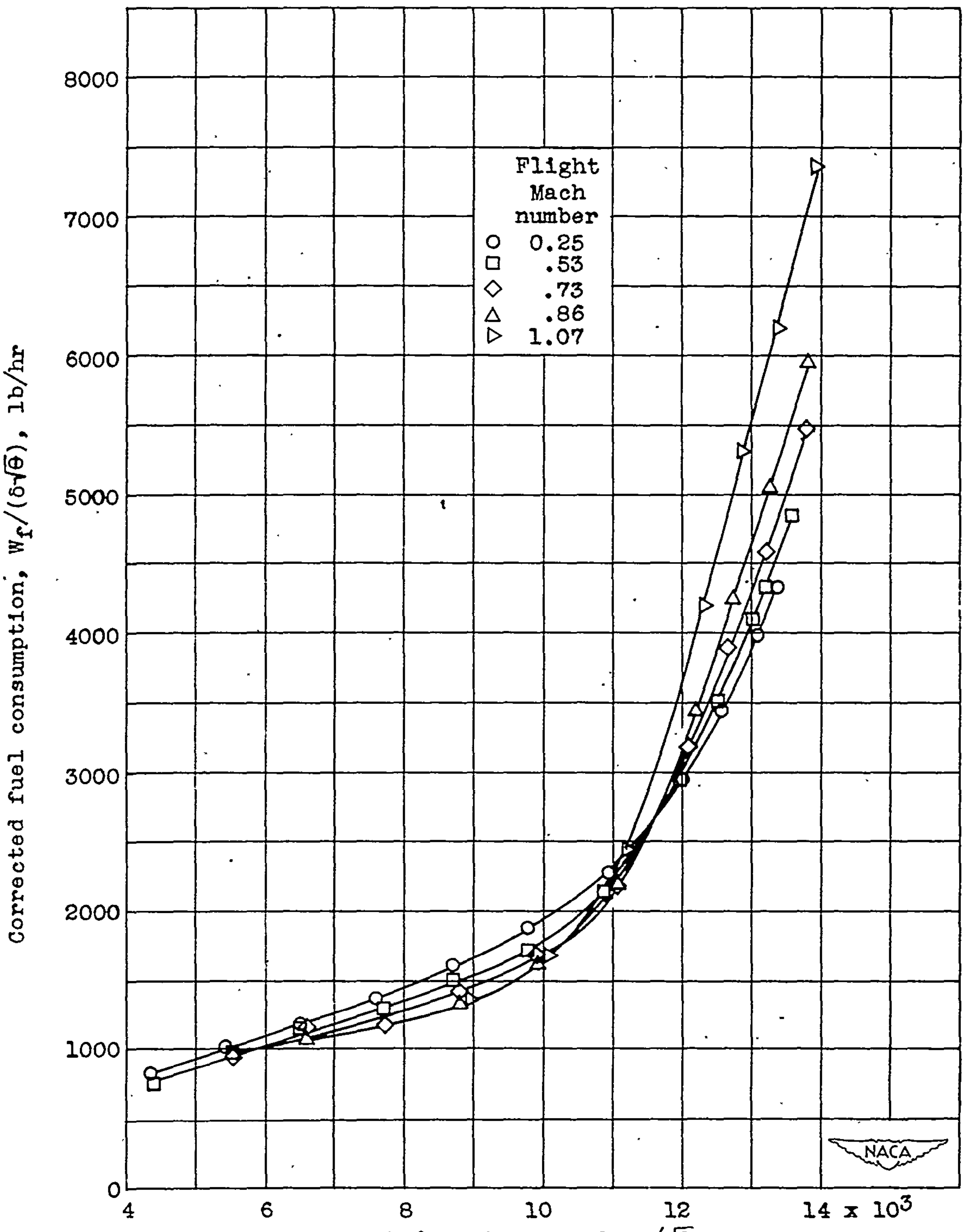
(b) Corrected net thrust.

Figure 8. - Continued. Effect of flight Mach number on variation of generalized turbojet engine performance with corrected engine speed. Altitude, 25,000 feet.



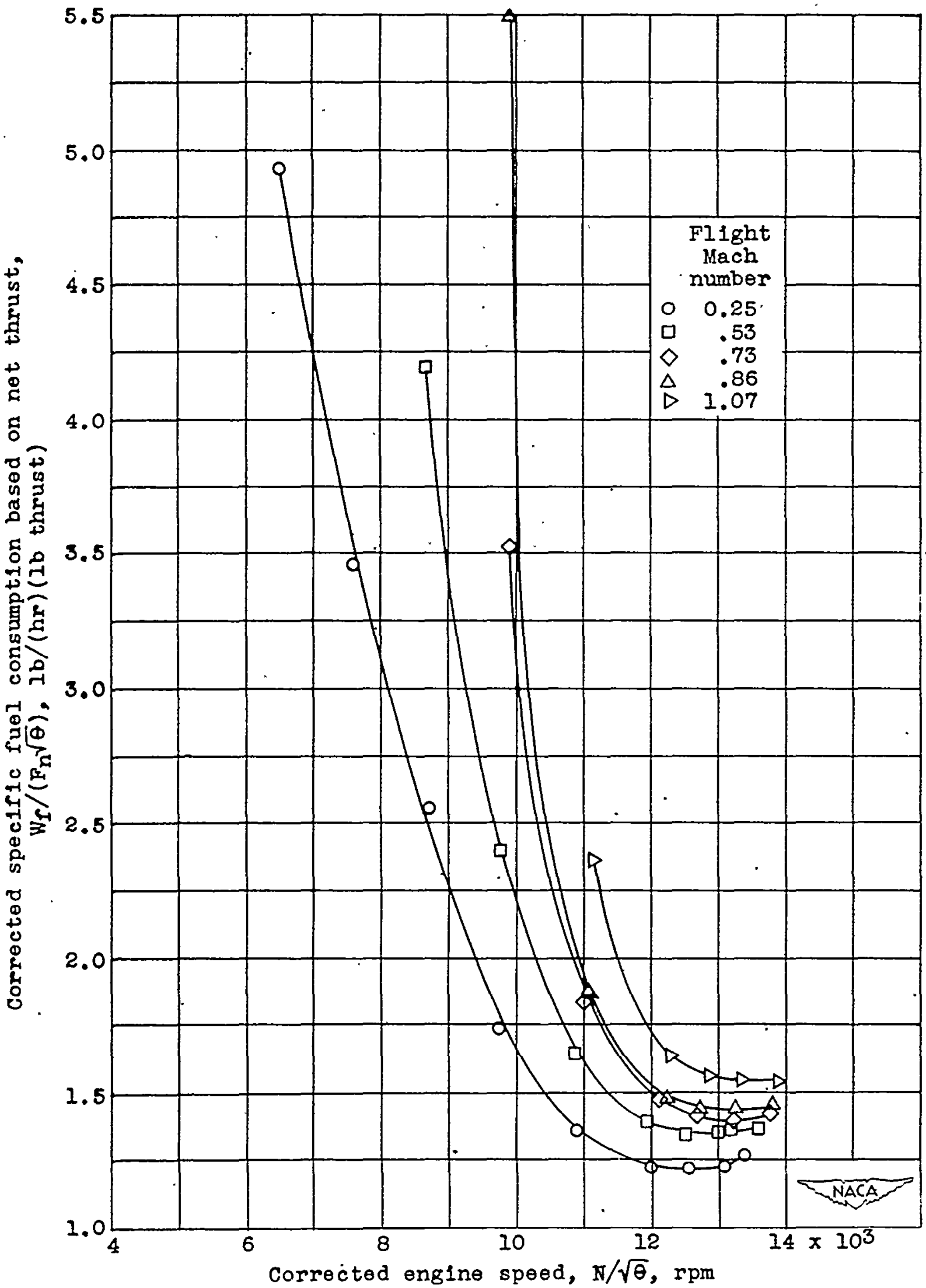
(c) Corrected air flow.

Figure 8. - Continued. Effect of flight Mach number on variation of generalized turbojet engine performance with corrected engine speed. Altitude, 25,000 feet.



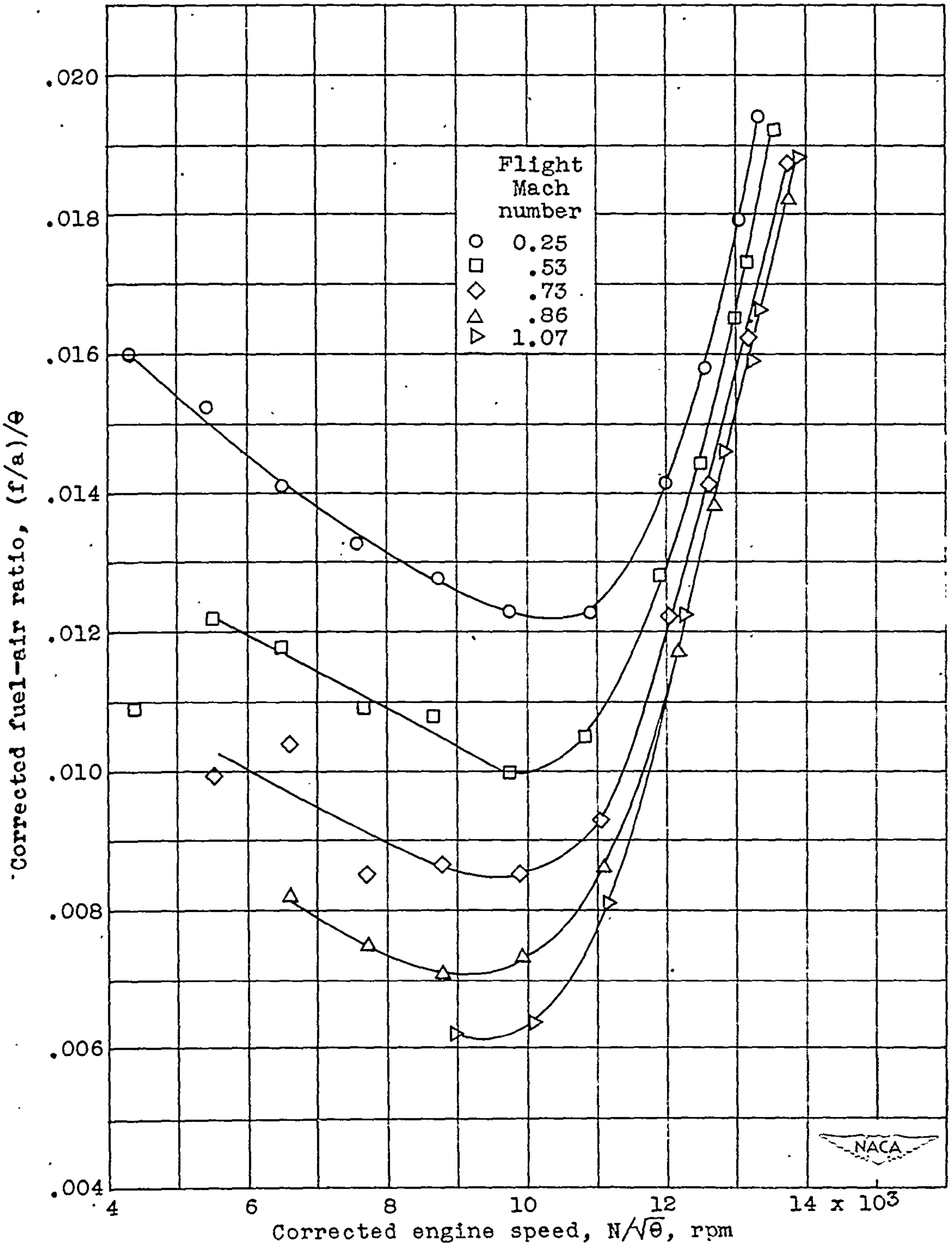
(d) Corrected fuel consumption.

Figure 8. - Continued. Effect of flight Mach number on variation of generalized turbojet engine performance with corrected engine speed. Altitude, 25,000 feet.



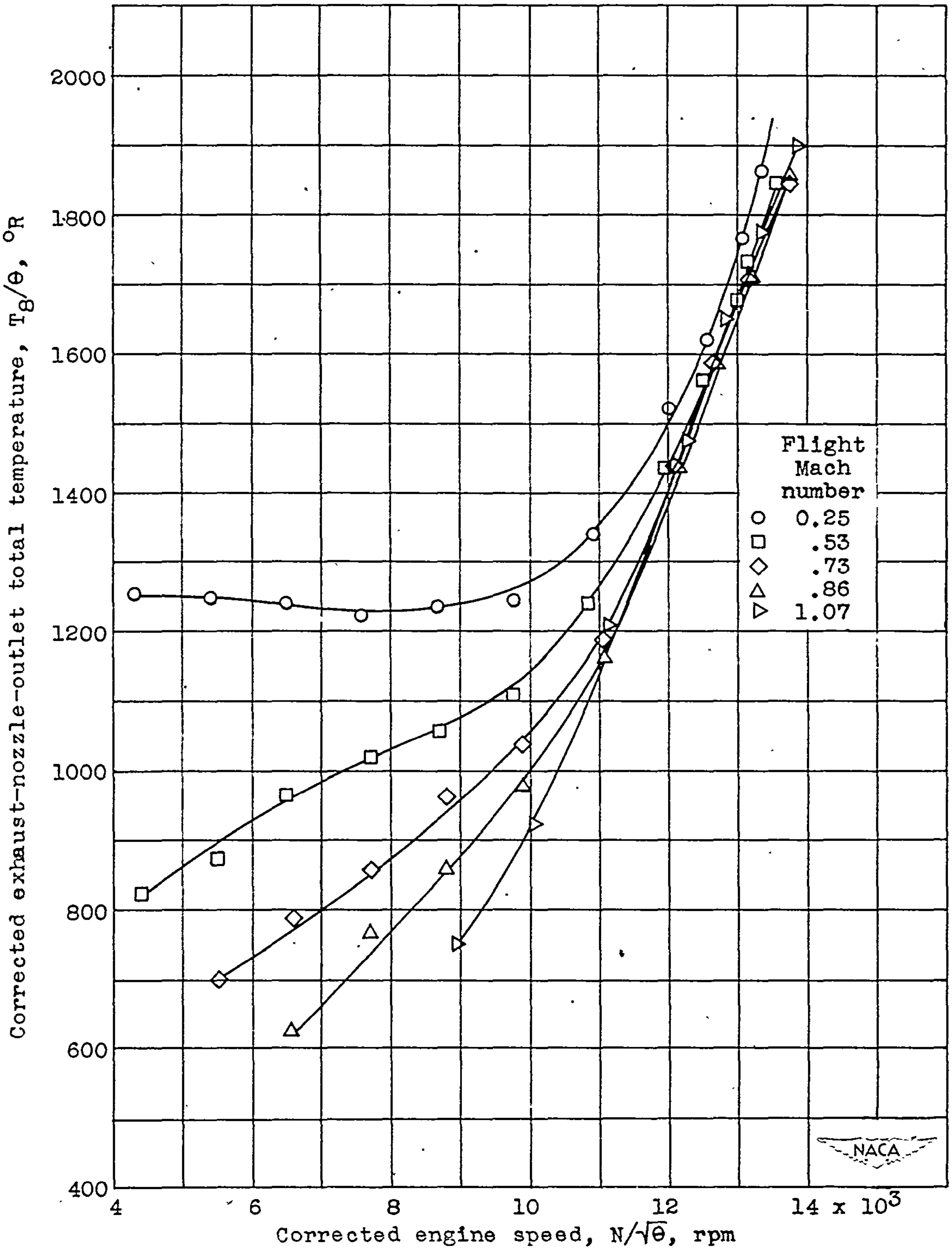
(e) Corrected specific fuel consumption based on net thrust.

Figure 8. - Continued. Effect of flight Mach number on variation of generalized turbojet engine performance with corrected engine speed. Altitude, 25,000 feet.



(f) Corrected fuel-air ratio.

Figure 8. - Continued. Effect of flight Mach number on variation of generalized turbojet engine performance with corrected engine speed. Altitude, 25,000 feet.



(g) Corrected exhaust-nozzle-outlet total temperature.

Figure 8. - Concluded. Effect of flight Mach number on variation of generalized turbojet engine performance with corrected engine speed. Altitude, 25,000 feet.